Maricopa County Air Quality Department
Phone: 602-506-6010
Email: AQmail@maricopa.gov

Maricopa.gov/AQ
CleanAirMakeMore.com

Permitting Handbook

Maricopa County Air Quality Department

October 2021

Table of Contents

About this Handbook

The purpose of the Permitting Handbook is to provide a practical guide to applying for and complying with an air quality permit.

Disclaimer

The contents of the Permitting Handbook should not be viewed as the definite statement of rule or regulation and how to achieve compliance. Where the clear language of a rule or regulation conflicts with this handbook, the rule or regulation will prevail.

The user of this handbook should clearly understand that the discussion contained in this document is not binding. This handbook is not intended to serve as an alternative to a rule or regulation.

Acronyms

$\mu g/m^3$	Micrograms per cubic meter
ACAAC	Acute and chronic ambient air concentrations
ACFM	Actual cubic feet per minute
ADEQ	Arizona Department of Environmental Quality
AMC	Adequate maintenance and calibration
API	American Petroleum Institute
ARM	Ambient ratio method
A.R.S.	Arizona Revised Statutes
ASTM	American Society for Testing and Materials
ATO	Authority to Operate
BACT	Best Available Control Technology
Bh	Building height
BPIPPRM	Building profile input program for plume rise model enhancements
Btu	British thermal unit
C	Celsius or Centigrade
CAA	Clean Air Act
cal/s	Calories per second
CAM	Compliance assurance monitoring
CEMS	Continuous emission monitoring system
CFR	United States Code of Federal Regulations
CO	Carbon monoxide
EC	Exhaust conditioner
EET	Emission estimation technique
EPA	U.S. Environmental Protection Agency
EPA-OAQPS	EPA Office of Air Quality Planning and Standards
F	Fahrenheit
fps	Feet per second
ft/s	Feet per second
FTIR	Fourier transform infrared
g/s	Grams per second

GEP	Good engineering practice
GHG	Greenhouse gas
HAP	Hazardous air pollutant
HF	Hydrofluoric acid
Hp	Horsepower
hr/day	Hour per day
hr/yr	Hour per year
IC	Internal combustion
ICE	Internal combustion engine
K	Kelvin
lbs/day	Pounds per day
lbs/hr	Pounds per hour
m/s	Meters per second
MACT	Maximum achievable control technology
MCAQD	Maricopa County Air Quality Department
MMBtu/hr	Metric million British thermal unit per hour
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_x	Nitrogen oxides
NSPS	New Source Performance Standards
NSR	New Source Review
O_3	Ozone
O&M	Operation and maintenance
OLM	Ozone limiting method
Pb	Lead
PBW	Projected building width
$PM_{2.5}$	Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 microns (micrometers)
PM_{10}	Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 microns (micrometers)
POU	Point of use
ppb	Parts per billion
ppm	Parts per million
ppmv	Parts per million volume
PSD	Prevention of significant deterioration
PTE	Potential to emit
PVMRM	Plume volume molar ratio method
RACT	Reasonably Available Control Technology
SCRAM	EPA's Support Center for Regulatory Atmospheric Modeling
SILs	Significant impact levels
SIP	State implementation plan
SO_x	Sulfur oxides
SO_2	Sulfur dioxide
TPY	Tons per year
U.S.C.	United States Code
VOC	Volatile organic compound
VPC	Vendor performance curve

INTRODUCTION

The Maricopa County Air Quality Department (MCAQD) has a staff of about 138 employees including managers, inspectors, engineers, specialists, and support staff. MCAQD is composed of six divisions: Director's Office, Planning and Analysis, Permitting, Compliance and Enforcement, Air Monitoring, and Travel Reduction and Outreach (which includes the Office of Business Assistance). Additionally, MCAQD's Ombudsman acts as an independent advocate for the needs of smaller sources.

The Permitting Division is responsible for implementing industrial source control programs as specifically required by the Clean Air Act (CAA) and Arizona statute.

Each major pollution source must have a Title V operating permit that specifies its compliance requirements. The permits are for a fixed term of not more than five years and require the collection of fees from permittees to cover program costs. The U.S. Environmental Protection Agency (EPA) can review, require revisions, or object to the issuance of Title V permits.

The Permitting Division processes applications for dust, open burning, general, Non-Title V, and Title V permits as well as asbestos notifications, subcontractor registrations, and vapor recovery decals. Other permit-related functions within this division include source impact dispersion modeling; source emissions testing acceptance and oversight; continuous monitoring system performance verification; and on-site source inspections. These activities ensure that emission sources are either complying with standards or are on a schedule for compliance by a specific date.

SECTION 1: AIR QUALITY PERMITS

An air quality permit is a written authorization to build, install, and/or operate equipment that emits or controls the emissions of air contaminants such as:

- Particulate matter ($PM_{2.5}$ and PM_{10})
- Carbon monoxide (CO)
- Nitrogen oxides (NO_x)
- Sulfur oxides (SO_x)
- Volatile organic compounds (VOCs)
- Hazardous air pollutants (HAPs)
- Greenhouse gases (GHGs)

The Permitting Division issues and renews air quality permits for facilities located in Maricopa County that emit air pollutants. Any business that generates air pollutants may require an air quality permit. Examples of sources and equipment that can require permits are:

- Boilers
- Incinerators
- Generators and engines
- Burn activity

- Chemical processing, handling, or storage
- Demolition and/or renovation activity
- Dry cleaners
- Gas stations
- Material handling (dust-generating, sand, gravel, and landscape material)
- Painting, coating, and printing operations

Examples of types of air quality permits are:

- Title V (major sources)
- Non-Title V (minor sources)
- General
- Dust Control (Rule 310)
- Open Burn

Air quality permit applications for each type of permit listed are available online. Visit maricopa.gov/1818 and select Air Quality Department (AQD) Online Portal. First time users must create an account prior to beginning the application process. Users of the AQD Online Portal are able to:

- Complete paperless applications and submit payment information in one convenient place,
- Modify submitted applications and update contact information, and
- Access their account to view and track all permits that have been created.

SECTION 2: SELECTING BACT AND RACT

This section provides guidance for the selection of Best Available Control Technology (BACT) and Reasonably Available Control Technology (RACT).

Under the EPA's New Source Review (NSR) program, if an owner or operator of a source is planning to build a new plant or modify an existing plant such that air pollution emissions will increase by a significant amount, then the owner or operator must obtain an NSR permit.

NSR permit conditions include requirements that the source minimize air pollution emissions by changing the process to prevent air pollution and/or installing air pollution control equipment. The terms "BACT" and "RACT" are acronyms for different program requirements under the NSR program.

There are seven rules in the Maricopa County Air Pollution Control Regulations that address NSR. Rule 241 (Minor New Source Review (NSR)) is one of those rules; it includes provisions and requirements for BACT and RACT for minor sources that are either new sources or modifications to existing sources of air pollution.

Overview of BACT and RACT

BACT applies to new or modified sources.

BACT applies to a new source, which is a source that exists after July 13, 1988, that has the potential to emit (PTE) any of the following emission threshold limits:

- 40 or more tons per year of VOCs; or
- 40 or more tons per year of NO_x; or
- 40 or more tons per year of SO_2; or
- 15 or more tons per year of PM_{10}; or
- 100 or more tons per year of CO; or
- 10 or more tons per year of $PM_{2.5}$; or
- 0.3 or more tons per year of Pb.

BACT applies to a modified source, if the source has an MCAQD air quality permit and proposes to make a physical change in or a change in the method of operation which increases the actual emissions of any regulated air pollutant emitted or which results in the emission of any regulated air pollutant not previously emitted. An increase in emissions is determined by comparing the source's PTE before and after the modification.

- Once a source has been permitted, any proposed modifications to the source may be subject to BACT requirements, if the proposed modification (not the entire source) causes an increase in the source's PTE in any one of the following amounts:
    - 40 or more tons per year of VOCs; or
    - 40 or more tons per year of NO_x; or
    - 40 or more tons per year of SO_2; or
    - 15 or more tons per year of PM_{10}; or
    - 100 or more tons per year of CO; or
    - 10 or more tons per year of $PM_{2.5}$; or
    - 0.3 or more tons per year of Pb.
- BACT applicability is evaluated for each individual modification and only applies to the source(s) being modified.
- An owner or operator of a source is not allowed to circumvent BACT requirements by dividing the modifications into separate permit applications. The burden of proof to show that an application for a permit or permit revision is not being submitted as a phase of a larger project shall be upon the applicant.
- An owner or operator may accept legally and practically enforceable limits on their operation in order to restrict emissions below the BACT thresholds and avoid the imposition of BACT. However, at such time as the applicability of any requirement in the Maricopa County Air Pollution Control Regulation Rule 241 (Minor New Source Review (NSR)) would be triggered by an existing source, solely by virtue of a relaxation of any enforceable limit on the capacity of the source to emit a pollutant, then the requirements of Rule 241 will apply to the owner or operator of the source in the same way they would apply to a new or modified source otherwise subject to Rule 241.

RACT applies to all new sources, which are sources that exist after July 13, 1988, or modified sources, until the emission level reaches the appropriate BACT emission threshold limit(s).

- The 300-series rules in Maricopa County Air Pollution Control Regulations are considered RACT requirements.
- An owner or operator of a source must comply with the rules in the Maricopa County Air Pollution Control Regulations and, for the purposes of BACT and RACT, the rules in Regulation III (Control of Air Contaminants).
- MCAQD is responsible for making the final determination of compliance with the RACT requirements.
- Even if an owner or operator of a source is not subject to any of the 300-series rules in Maricopa County Air Pollution Control Regulations, an owner or operator may be subject to RACT. MCAQD makes this determination on a case-by-case basis, considering the technological feasibility and cost-effectiveness of the application of the control technology to the source category.

Determination of Emissions Level

- The owner or operator of a source must present an emissions analysis in order to determine whether the future emissions increase will trigger BACT requirements.
- The increase in emissions (future PTE minus current PTE) must be calculated using the PTE for each new source or modification to an existing source.
- For a new, stand-alone unit, the emissions increase is the PTE of the subject unit or the allowable emissions, as agreed by the owner or operator of the source.
- For a limited modification of an existing source, the potential emissions increase is calculated for the unit alone.
- If the modification is linked closely to other existing areas of the source, the emissions must be evaluated for all of the affected existing areas of the source.
    - The modification must have a direct relationship to increased emissions in other areas of the source (e.g., by a debottleneck effect or if the modification can increase the utilization of another process line).
    - The owner or operator of the source must show an analysis by quantifying the emissions increase in the entire affected area due to the modification.
- The increase in emissions must be calculated by comparing the difference in emissions from the PTE before the modification to the PTE after the modification.
- The PTE may be substituted by new, allowable emissions if the terms of the enforceable permit conditions are agreed to by the owner or operator of the source.
- The fugitive emissions (i.e., emissions which could not reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening) cannot be considered in determining whether the source is subject to RACT or BACT, unless the source belongs to one of the categories listed below. To the extent fugitive emissions are quantifiable, fugitive emissions must be included when determining PTE and when determining PTE before and after a modification.
    - Coal cleaning plants with thermal dryers
    - Kraft pulp mills
    - Portland cement plants

    - Primary zinc smelters
    - Iron and steel mills
    - Primary aluminum ore reduction plants (with thermal dryers)
    - Primary copper smelters
    - Municipal incinerators capable of charging more than 250 tons of refuse per day
    - Hydrofluoric, sulfuric, or nitric acid plants
    - Petroleum refineries
    - Lime plants
    - Phosphate rock processing plants
    - Coke oven batteries
    - Sulfur recovery plants
    - Carbon black plants using the furnace process
    - Primary lead smelters
    - Fuel conversion plants
    - Sintering plants
    - Secondary metal production plants
    - Chemical process plants, which shall not include ethanol production facilities that produce ethanol by natural fermentation included in North American Industry Classification System codes 325193 or 312140
    - Fossil-fuel boilers, or combinations thereof, totaling more than 250 million British thermal units (Btu) per hour heat input
    - Petroleum storage and transfer units with a total storage capacity more than 300,000 barrels
    - Taconite ore processing plants
    - Glass fiber processing plants
    - Charcoal production plants
    - Fossil fuel-fired steam electric plants and combined cycle gas turbines of more than 250 million Btu per hour rated heat input
    - Any other stationary source category which, as of August 7, 1980, is being regulated under Section 111-Standards of Performance for New Stationary Sources of the Act or under Section 112-National Emission Standards for HAPs of the Act
- If the owner or operator of a source asserts that a proposed modification is below the BACT emission threshold limits, the owner or operator must include in their permit application a summary of all prior modifications within the last five years.
    - The owner or operator must demonstrate that the proposed modification is not part of a larger project that would be subject to BACT.
    - The owner or operator cannot circumvent BACT requirements by submitting permit applications in phases. The burden of proof is on the owner or operator to show that a permit application is not being submitted as a phase of a larger project.
    - Emission increases from all modifications must be documented by the permit engineer as part of the Permitting Division technical evaluation.

Top-Down BACT Analysis

- The owner or operator of the source, not MCAQD, must conduct a top-down BACT analysis for each pollutant that exceeds the BACT emission threshold limits.

- Once BACT is triggered, the owner or operator has the responsibility to research control options on a nationwide basis and to present a complete top-down BACT analysis for review and approval by MCAQD.
- The selection of BACT should address the control of each emission point for the subject pollutant at the source or at the affected area in the case of a modification.
- The owner or operator must document all of the following in the top-down BACT analysis:
    - Identify, for the emissions unit in question, all available control options
    - Rank in descending order of effectiveness, air pollution control technologies or techniques with a practical potential for application to the emissions unit and the regulated pollutant under evaluation
    - Eliminate technically infeasible options
    - Show, based on physical, chemical, and engineering principles, the technical difficulties of the control options with respect to the source-specific or emissions unit-specific factors that would preclude the successful use of the control options for the emissions unit under review
    - Rank all remaining control options not eliminated due to technical infeasibility and list in order of overall control effectiveness for the pollutant under review, with the most effective control option at the top:
        - Prepare a separate list for each pollutant and for each emissions unit subject to the BACT requirements.
        - The list should present the array of control alternatives and should indicate the effectiveness of each alternative.
        - The list should indicate if the alternative has been achieved in practice for the class and category of source in question.
- Eliminate from consideration, upon approval by MCAQD, control options that are not cost effective by using the Annualized Cost Method:
    - Calculate an equivalent annual cost from a capital cost using a capital recovery factor.
    - Determine annual operating cost (e.g., labor, fuel, maintenance, and utilities).
    - Calculate the total annual cost by summing the equivalent annual control equipment cost and the annual operating cost.
    - Calculate the control cost by dividing the total annual cost by the tons of pollutants controlled per year.
- Select the top-ranked control technology as BACT, unless it is demonstrated and MCAQD concurs that technical considerations or energy, environmental, or economic impacts justify a conclusion that the most stringent technology is not achievable. If the most stringent technology is eliminated, then the next most stringent alternative must be selected.

Alternative to Top-Down BACT Analysis

To streamline the BACT selection process, MCAQD will accept BACT for the same or similar source category as listed by the South Coast Air Quality Management District (SCAQMD), San Joaquin Valley Air Pollution Control District (SJVAPCD), the Bay Area Air Quality Management District (BAAQMD), or other regulatory agency accepted by MCAQD as a viable alternative.

If an owner or operator of a source opts to select control technology for the same or similar source category accepted by the air quality management districts in California, the owner or operator may forego conducting the top-down BACT analysis.

Applicability of BACT Control to Less Effective Emissions Points

BACT control must apply to all emissions points of the triggering pollutant emitted from the new or modified emissions unit.

If the overall cost to control every emissions point becomes prohibitive, the owner or operator of the source must include calculations in the top-down BACT analysis to justify whether the elimination of certain emissions points makes the project feasible.

MCAQD will take the cost effectiveness value under consideration in determining whether emissions points can be eliminated from the overall BACT control system.

The formula of "The Cost Effectiveness Analysis for the Uncontrolled Portion" is shown in the following equation:

$$V = \frac{W-X}{Y-Z}$$

Where: V = Dollars per ton (uncontrolled portion) of pollutant
W = Annualized cost of controlling all emissions points
X = Annualized cost of controlling the selected emissions points
Y = Total tons removed from all emissions points
Z = Tons removed from the selected emissions points

BACT Implementation Plan

The owner or operator of the source must prepare and submit a BACT Implementation Plan for MCAQD approval.

The BACT Implementation Plan must include the following information:

- Individual emissions calculations for each emissions point that contributes to the BACT emission threshold limits; and
- Identification of all emissions points to be routed to the control system; and
- Justification for the elimination of emissions points from control; and
- Top-down BACT analysis or alternative control analysis; and
- Expected effectiveness of the selected control in terms of emissions capture and destruction or control efficiency; and
- Process design parameters for the control device; and
- Control device installation plan and timeframe.

SECTION 3: MINOR NEW SOURCE REVIEW (NSR) AIR DISPERSION MODELING

This section provides guidance to sources that are required to use an air dispersion model to conduct an ambient air quality impact assessment. This section only addresses screen models and refined models for the purposes of regulating sources under Maricopa County Air Pollution Control Regulations Rule 241 (Minor New Source Review (NSR)).

This section does not address modeling conducted under Maricopa County Air Pollution Control Regulations Rule 240 (Federal Major New Source Review (NSR)) or under the federal Prevention of Significant Deterioration (PSD) program. Major sources subject to federal major NSR or the federal PSD program will find additional information in the Air Dispersion Modeling Guidelines for Arizona Air Quality Permits at: azdeq.gov/environ/air/permits/download/modeling_guidance.pdf.

Background

To meet the requirements of the CAA and EPA regulations, state and local agencies are required to develop a minor NSR program.

NSR is a long-standing CAA permitting program that requires businesses to obtain an air pollution control permit before they begin construction or make any major modifications to their business processes. NSR must ensure that air quality is not significantly degraded from the addition of new or modified business processes, while also providing flexibility to businesses to improve or modernize their operations. Air quality permits must include an air quality analysis to demonstrate that new emissions emitted from the business will not cause or contribute to a violation of a National Ambient Air Quality Standard (NAAQS).

NAAQS are standards established by the EPA under the CAA that apply to outdoor air throughout the country. Primary standards are designed to protect human health with an adequate margin of safety for sensitive populations such as children, the elderly, and individuals suffering from respiratory diseases.

Under the minor NSR regulations, the program must contain "legally enforceable procedures" to prevent the construction or modification of a source if it will "interfere with the attainment or maintenance of" the NAAQS.

In December 2019, MCAQD adopted minor NSR requirements in its revision of Maricopa County Air Pollution Control Regulations Rule 241 (Minor New Source Review (NSR)).

Ambient Air Quality Impact Assessment

Rule 241 requires new sources and existing sources that increase emissions above prescribed thresholds to perform an ambient air quality impact assessment to demonstrate that emissions from the new or modified source do not interfere with attainment or maintenance of the NAAQS.

The primary means by which an air quality impact assessment is performed is through the use of an air dispersion model.

Air Dispersion Model

An air dispersion model uses a series of equations that mathematically describe the behavior of pollutants in the air. It provides a cause-effect link between the emissions in the air and the resulting air pollution concentrations. The equations and algorithms represent atmospheric processes, which are used to determine if a new or existing source of air pollution will cause or contribute to an exceedance of a NAAQS. The results of these analyses are then used in helping sources properly design and configure their facility to minimize the impacts of their emissions.

Two different types of air dispersion models have been developed:

1. Screen modeling: A simple modeling analysis that might include a single stack

2. Refined modeling: A complex modeling analysis that might include multiple stacks, roads, and fugitive sources

A screen model, such as AERSCREEN or SCREEN3, is used to provide a conservative estimate of pollution concentrations at specified ground-level locations (called receptors) surrounding an emission source. A screen model is used to evaluate a single source.

A refined model, such as AERMOD and CALPUFF, is used to produce more accurate concentration estimates and requires detailed and precise input data. A refined model is capable of estimating multiple emission sources and receptors.

AERMOD is the recommended model for mostly regulatory modeling applications per 40 CFR Part 51, Appendix W.

CALPUFF is mainly used to assess distant impacts of emissions, particularly at national parks and wilderness areas.

Unless prior written approval has been secured from MCAQD to use a different model, the latest version of AERSCREEN must be used for screen modeling, and AERMOD must be used for refined modeling.

MCAQD will consider alternative models on a case-by-case basis.

For more information regarding air dispersion modeling, including models available for download, visit epa.gov/scram.

Regulatory Triggers

An applicant for a permit subject to Rule 241 must conduct an ambient air quality impact assessment upon MCAQD's request. However, as a practical first approximation, MCAQD will require the

assessment to be performed by new sources with a PTE greater than, or equal to, a minor NSR modification threshold detailed in Table 1 or an existing source that makes a minor NSR modification.

Table 1: Minor NSR Modification Thresholds	
Pollutant	**Minor NSR Modification Threshold (tons/year)**
$PM_{2.5}$	5.0
PM_{10}	7.5
SO_2	20
NO_x	20
VOC	20
CO	50
Pb	0.3

MCAQD has discretion to require other sources subject to Rule 241 to conduct an ambient air quality impact assessment if there is reason to believe that the source could interfere with the attainment or maintenance of the NAAQS. A source should contact MCAQD to discuss applicability before a permit application involving the following is submitted:

- The source has agreed to an enforceable emission limit to avoid triggering Rule 241 that is now seeking to relax that limit above the minor NSR modification threshold; or
- The source has activities that involve the clustering of numerous small to moderate sized sources at a single location.

Fugitive emissions are not included in the determination as to whether a facility triggers minor NSR. However, once triggered, fugitive emissions must be included in the NAAQS Compliance Assessment, as required by Rule 241.

The minor NSR threshold for VOCs does not currently trigger the need for an ambient air quality impact assessment due to the fact that no NAAQS exists for this pollutant.

Examples:

- New Source: A source plans to construct a new automotive assembly plant in Maricopa County. The plant has a PTE of 50 tons per year (tpy) NO_x, 60 tpy SO_2, and 5 tpy PM_{10}. In this example, the 50 tpy of NO_x and 60 tpy of SO_2 subject the plant to Rule 241 which requires the facility to conduct modeling an ambient air quality impact assessment for these pollutants. The PM_{10} emissions do not exceed the minor NSR modification thresholds in Table 1 above and therefore do not require an ambient air quality impact assessment.
- Modified Source: An existing source is proposing a modification that involves the installation of a new boiler. The source is currently permitted to emit 55 tpy of NO_x, 55 tpy of CO, and 10 tpy of SO_2. The new boiler has a PTE of 25 tpy NO_x, 25 tpy of CO, and 21 tpy of SO_2. The new site-wide PTE of the facility is now 80 tpy NO_x, 80 tpy CO, and 31 tpy SO_2. Since the modification increased emissions of NO_x and SO_2 above the minor NSR modification

thresholds in Table 1 above, these pollutants would be subject to Rule 241 and would require an ambient air quality impact assessment. Important to note, although the post-project facility site-wide CO emissions are above the minor NSR modification threshold, an ambient air quality impact assessment may not be required since the modification itself is not above the 50 tpy threshold value for CO. It is assumed in this example that the source did not accept a limit to avoid Rule 241 in the past which would require a case-by-case determination before an ambient air quality impact assessment is ruled out.

Significant Impact Levels (SILs)

It is the EPA's policy under the PSD program to allow the use of SILs to determine whether a proposed new or modified stationary source will have a significant impact to the ambient air.

For a new or modified source, the PTE increase associated with the proposed project may be subject to an ambient air quality impact assessment to compare with the SILs. If the ambient air quality impact assessment results are below the SILs, the ambient air quality impact assessment demonstration is satisfied. Otherwise, an ambient air quality impact assessment of the PTE increase should be made and the maximum off-site concentration added to representative ambient background concentrations to compare with the NAAQS.

The current SILs are listed in Table 2. Units of measure for the standards are micrograms per cubic meter of air ($\mu g/m^3$).

Table 2: Significant Impact Levels (SILs)

Pollutant	Averaging Time	SIL ($\mu g/m^3$)
NO_2	1 hour	7.5[a]
	Annual	1
SO_2	1 hour	7.8[b]
	3 hours	25
$PM_{2.5}$	24 hours	1.2
	Annual	0.3
PM_{10}	24 hours	5
CO	1 hour	2,000
	8 hours	500
O_3	8 hours	Not Applicable
Pb	Rolling 3-month average	Not Applicable

[a]Interim 1-hour NO_2 SIL, 4 parts per billion
[b]Interim 1-hour SO_2 SIL, 3 parts per billion

NAAQS and Pollutants to be Included in an Ambient Air Quality Impact Assessment

The purpose of the minor NSR program is to ensure that criteria pollutants (i.e., CO, NO_2, O_3, $PM_{2.5}$, PM_{10}, SO_2, and Pb) emitted from a source will not cause or significantly contribute to a violation of any NAAQS.

The NAAQS are listed in Table 3. Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air ($\mu g/m^3$).

Table 3: National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Time	Level	Form
CO	8 hours	9 ppm	Not to be exceeded more than once per year
	1 hour	35 ppm	
NO_2	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	1 year	53 ppb	Annual Mean
O_3	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
$PM_{2.5}$	1 year	12.0 $\mu g/m^3$	Annual mean, averaged over 3 years
	24 hours	35 $\mu g/m^3$	98th percentile, averaged over 3 years
PM_{10}	24 hours	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
SO_2	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
Pb	Rolling 3-month average	0.15 $\mu g/m^3$	Not to be exceeded

Ozone is a secondary pollutant formed in the atmosphere from a series of photochemical reactions involving VOCs and NO_x. Due to the lack of screening tools and techniques for ozone modeling, MCAQD does not currently require sources to conduct air dispersion modeling for VOCs. MCAQD may adopt a modeling methodology to address the impact of ozone should these techniques become available in the future.

Process for Conducting an Ambient Air Quality Impact Assessment

The process for conducting an ambient air quality impact assessment consists of the following five steps, which are also illustrated in the Process for Conducting an Air Quality Impact Assessment Flowchart (see Appendix E).

Step One: Determine if the new or modified source is subject to the ambient air quality impact assessment requirements of Rule 241.

- An ambient air quality impact assessment is required for new sources with allowable emissions greater than or equal to the minor NSR modification thresholds (see Table 1) or existing sources that makes a minor NSR modification.
- Other sources subject to Rule 241 may be required to perform an assessment upon MCAQD's request.
- Contact MCAQD to set up a pre-application meeting to discuss whether or not an ambient air quality impact assessment is required.
- If the source is subject to the ambient air quality impact assessment requirements, proceed to Step Two.

Step Two: The applicant must conduct a preliminary ambient air quality impact assessment to predict whether the proposed source(s) could cause a significant impact on existing air quality.

- New Source: For a new source, screen modeling must be performed for each criteria pollutant above the minor NSR modification threshold. The maximum potential short-term and long-term emission rates based on PTE must be modeled and compared with the SILs shown in Table 2. If the screen model results are below the SILs, the modeling demonstration is satisfied.
- Modified Source: For an existing source making a minor NSR modification, the PTE increase associated with the proposed project must be modeled using a screen model, and the results must be compared with the SILs. If the modeling results are below the SILs, the modeling demonstration is satisfied.

If the results show output concentrations above the SILs, the applicant must either consider the options in "Next Steps" or proceed to Step Three or Step Four.

Step Three: The applicant may elect to perform a preliminary ambient air quality impact assessment to predict whether the proposed source(s) could cause an exceedance of the NAAQS.

- New Source: For a new source, screen modeling must be performed for each criteria pollutant above the minor NSR modification threshold. The maximum potential short-term and long-term emission rates based on PTE should be modeled and added to a representative background concentration for that pollutant. The result should then be compared with the NAAQS shown in Table 3. If the screen model results are below the NAAQS, the modeling demonstration is satisfied. Screen modeling is described in more detail in "Screen Model: Principles and Procedures".
- Modified Source: For an existing source making a minor NSR modification, the PTE increase associated with the proposed project must be modeled using a screening tool and added to a representative background concentration for that pollutant. The result should then be compared with the NAAQS. If the modeling results are below the NAAQS, the modeling demonstration is satisfied.

If the results show output concentrations above the NAAQS, the applicant must either consider the options in "Next Steps" or proceed to Step Four.

The procedure for determining a representative background concentration is discussed in "Background Concentrations".

Step Four: The applicant must perform an ambient air quality impact assessment using a refined model to determine whether the proposed source(s) could have a significant impact on existing air quality. It is the applicant's responsibility to perform refined modeling. Refined modeling is described in more detail in "Refined Modeling".

- New Source: For a new source, refined modeling must be performed for each criteria pollutant above the minor NSR modification threshold. The maximum potential short-term and long-term emission rates based on PTE should be modeled and compared with the SILs. If the refined model results are below the SILs, the modeling demonstration is satisfied.
- Modified Source: For an existing source making a minor NSR modification, the PTE increase associated with the proposed project must be modeled with a refined model and compared with the SILs. If the modeling results are below the SILs, the modeling demonstration is satisfied.

If the results show output concentrations above the SILs, the applicant must either consider the options in "Next Steps" or proceed to Step Five.

Step Five: The applicant must perform an ambient air quality impact assessment using a refined model to determine whether the proposed source(s) could cause an exceedance of the NAAQS. It is the applicant's responsibility to perform refined modeling. Refined modeling is described in more detail in "Refined Modeling".

- New Source: For a new source, refined modeling must be performed for each criteria pollutant above the minor NSR modification threshold. The maximum potential short-term and long-term emission rates based on PTE should be modeled and added to a representative background concentration for that pollutant. The result should then be compared with the NAAQS shown in Table 3. If the refined model results are below the NAAQS, the modeling demonstration is satisfied.
- Modified Source: For an existing source making a minor NSR modification, the PTE increase associated with the proposed project must be modeled using a refined model and added to a representative background concentration for that pollutant. The result should then be compared with the NAAQS shown in Table 3. If the refined model results are below the NAAQS, the modeling demonstration is satisfied.

If the results show output concentrations above the NAAQS, the applicant must either consider the options in "Next Steps" or MCAQD will deny the permit application.

The procedure for determining a representative background concentration is discussed in "Background Concentrations".

Next Steps: If the ambient air quality impact assessment indicates that a SIL or NAAQS is initially exceeded, the applicant has the opportunity to consider several options to prevent the exceedance. Preliminary NAAQS exceedances might be avoided through the use of some or all of the following:

- Refining emissions estimates by using other defensible emission factors than those used in the preliminary modeling analysis (e.g., performance testing data rather than AP-42).
- Limiting operational hours or process throughputs
- Optimizing stack parameters for better pollutant dispersion (i.e., raise stack heights, increase exhaust airflows (subject to restrictions on prohibited dispersion techniques), or crown stack diameters to obtain higher exhaust velocities). However, the EPA's "prohibited dispersion techniques" as defined in 40 CFR §§ 51.100 (hh)(1)(i)-(iii) must not be used. Examples of these prohibited dispersion techniques include improper stack heights and varying the emissions rate or shutting down based on atmospheric conditions or ambient pollution concentrations
- Relocating emission sources to other portions of a facility which would lead to lower modeled offsite impacts
- Source testing to refine emissions estimates
- Installing pollution controls to limit emissions

Modeling Report

After an ambient air quality impact assessment has been conducted, the applicant must submit a modeling report to MCAQD. At a minimum, the modeling report should include all of the following:

- Company and facility name
- Permit number and type of permit
- Overview of the project, project location, and brief description of facility operations
- Description of the federal and Arizona regulations and guidelines that pertain to the proposed project; focus should be on modeling requirements
- Detailed facility layout, including locations of emission points and process equipment
- Emission profiles with all short- and long-term emission rates identified and the method used to determine such values
- Stack parameters used
- Modeling approach, including parameters used and results

Screen Model: Principles and Procedures

Unless prior written approval has been secured from MCAQD to use a different model, the latest version of AERSCREEN must be used for screen modeling. The AERSCREEN model has replaced the previous SCREEN3 model as the recommended model; therefore, SCREEN3 will not be accepted by MCAQD for this type of modeling.

AERSCREEN is a simple screening-level air quality model based on AERMOD. The AERSCREEN model can be downloaded from EPA's website at: epa.gov/scram/air-quality-dispersion-modeling-screening-models.

The screening analysis performed with AERSCREEN must be consistent with the guidance contained in EPA's "Guideline on Air Quality Models" and must include the appropriate screening modeling documents, such as those described in the "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources".

Additional guidance for AERSCREEN may be obtained in the "EPA AERSCREEN User Guide". See: gaftp.epa.gov/Air/aqmg/SCRAM/models/screening/aerscreen/aerscreen_userguide.pdf

Options for Conducting a Screen Model

An applicant must conduct a screen model or may elect to request MCAQD to conduct a screen model. If an applicant elects to request MCAQD to conduct a screen model, MCAQD will charge for this service as a billable permit action at the current hourly permit processing rate. In either case, the AERSCREEN Data Input Form must be completed (see Appendix A).

Emission Rates

- A screen model must be conducted for each criteria pollutant that triggers minor NSR review and must include both process and fugitive emissions.
- Maximum emission rates: The maximum short-term emission rates for each source must be used to demonstrate compliance with all short-term averaging standards and guidelines. For example, if equipment is to be operated under different conditions, such as operating hours, load factor, or fuel type, each emission scenario must be evaluated and the maximum short-term emission rate must be used. In addition, the screen model must include emissions from all source types that could be operated simultaneously.
- Controls: The applicant may take credit for any emissions reductions provided by controls that are made enforceable through the air permit.

Types of Emissions Sources

The actual characteristics of a proposed emission source should be reflected by the screen model. The source types found in the screen model, AERSCREEN, are described below.

Point Sources

Point source characterization is used to simulate emissions that are emitted from a stack, chimney, or vent. AERSCREEN can be used for a single point, vertical stack, capped stack, or horizontal stack. Each of the following parameters are required to model point source emissions:

- Emission rate in grams per second (g/s)
- Stack inside diameter in meters
- Stack height above grade in meters
- Stack gas exit velocity in meters per second (m/s)
- Stack gas exit temperature in degrees K

When modeling horizontal stacks or vertical stacks with rain caps, the exit velocity should be set to 0.001 m/s to eliminate plume rise from momentum, and the flow rate should be held constant. In order to maintain a constant flow rate for vertical rain-capped stacks, the modeled stack diameter must be different from the actual stack diameter. The modeled stack diameter for vertical rain-capped stacks should be calculated using the following equation:

$$d_m = d_a \left(\frac{V_a}{V_m}\right)^{1/2}$$

Where: d_m = modeled stack diameter
d_a = actual stack diameter
V_m = modeled stack exit velocity (i.e., 0.001 m/s)
V_a = actual stack exit velocity

Rectangular and Circular Area Sources

The rectangular area source characterization is used to simulate emissions that initially disperse in two dimensions with little or no plume rise, such as ground-level or low-level emissions from storage piles, slag dumping, landfills, or holding ponds. For a simple area source, each of the following parameters are required:

- Area emission rate in grams per second per square meter $(g/(s\text{-}m)^2)$
- Source release high above ground in meters
- Length of the long side of the area in meters
- Length of the short side of the area in meters
- Optional inputs include the orientation angle in degrees and initial vertical dimension of the area source plume rise, in meters.

The circular area source characterization requires the radius of the circle in meters. The release height should be set to zero, except in the case of tank farms and storage areas, where the release height should be set to the average height of the pollutant release. The downwind distance used in the model is measured from the center of the area source, not its edge. The modeler should be careful to measure the correct distance from the center of the area source to the nearest ambient air boundary in setting the first receptor distance. Generally, the receptor distance should not be less than the length of one side of the area source.

Volume

Volume source characterization is used to simulate emissions that initially disperse in three dimensions with little or no plume rise, such as emissions from vents on a building roof, multiple vents from a building, and fugitive emissions from pipes, stockpiles, and conveyor belts. Each of the following parameters are required to model volume source emissions:

- Emission rate in g/s
- Center point height above ground in meters
- Initial lateral dimension of the volume in meters
- Initial vertical dimension of the volume in meters

Volume sources must have a square base but need not be a cube. For a square, or nearly square, source, the actual building dimensions (height and width) must be used for the screening analysis. For non-square sources, the width of the source must be set equal to the minimum building length.

The downwind distance used in the model is measured from the center of volume source, not its edge. The correct distance from the center of the source to the nearest ambient air boundary must be measured, when setting the first receptor distance.

A volume source is defined by its center point height and initial lateral and vertical dimensions. The center point height is the center of the volume sourcend so it must be set equal to one-half the average building height. The initial lateral dimension for a volume source must be set equal to its width divided by 4.3. The initial vertical dimension for a volume source must be set equal to the average building height divided by 2.15.

Flares

The screen model, AERSCREEN, simulates emissions from flares, such as those used to burn landfill gas. Each of the following parameters are required to model emissions from flares:

- Emission rate in g/s
- Stack height in meters
- Heat release rate in cal/s
- Radiative heat loss fraction

Flares are typically modeled similarly to point sources. However, the heat release from the flare is utilized to calculate plume rise. The heat loss fraction value must be specified in the model or the AERSCREEN default value of 0.55 must be used.

Building Downwash

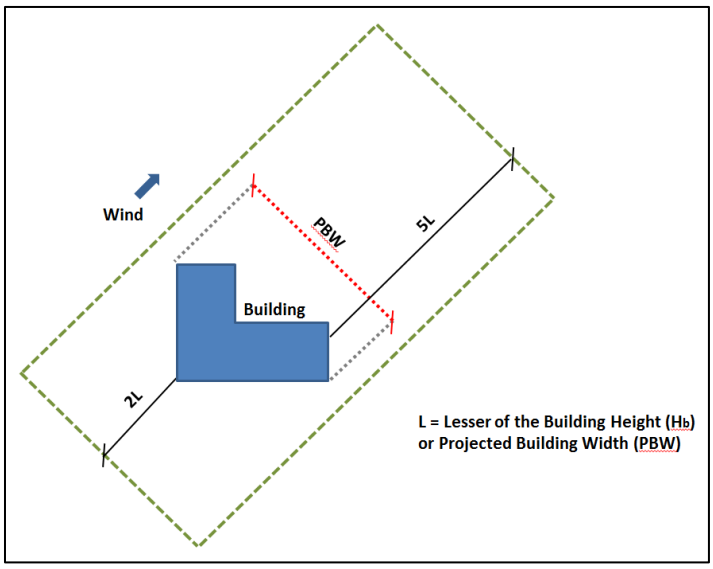
Building downwash is a term used to represent the potential effects of a building on the dispersion of emissions from a source. For point sources with stack heights less than good engineering practice (GEP), stack height must consider dispersion impacts associated with building downwash, also known as building wake effects.

$$HGEP = Hb + 1.5L$$

Where: H_{GEP} = the GEP stack height;
H_b = the building height; and
L = the lesser of the building height or maximum projected width (the width as seen from the source looking towards either the wind direction or the direction of interest) of the building

The GEP height is the highest height calculated for any nearby building. A building is considered to be nearby if it is within five times the lesser of its height or width from the stack. This distance is commonly referred to as the building's region of influence. The most conservative building dimensions are usually associated with the height and diagonal width of the tallest nearby building.

Figure 1: Illustration of Good Engineering Practice Stack Height Parameters



Once building downwash applicability is determined, the following parameters are required to be input into AERSCREEN:

- Options to use an existing building profile input program for plume rise model enhancements (BPIPPRM), if available
- Building height
- Maximum building horizontal dimension
- Minimum building horizontal dimension
- Degrees from North of maximum building horizontal dimension (0-179 degrees)
- Degrees from North of stack location relative to building center (0-360 degrees)
- Distance between stack and building center

Land Use: Urban and Rural

It is important to determine whether a source is located in an urban or rural dispersion environment. In general, urban areas cause greater rates of dispersion because of increased turbulent mixing and buoyancy-induced mixing.

EPA guidance identifies two recommended methods to determine whether a source resides in an urban area:

- Land Use: Draw a three kilometer (km) radius around the source and analyze the land use. If more than 50% of the land use can be categorized as industrial (heavy or medium), commercial, or residential, the source exists in an urban area.
- Population: If the population surrounding the source exceeds 750 people per square km (1,943 people/square mile), the source exists in an urban area.

The land use procedure is preferred. If the area qualifies as urban, AERSCREEN requires a population figure to be entered. The value must be at least 100 for AERSCREEN to accept the urban selection.

Meteorology and Surface Characteristics

The screen model, AERSCREEN, consists of the MAKEMET program, which simulates specific worst-case meteorology using representative ambient air temperatures, minimum wind speed, and surface characteristics type (i.e., albedo, Bowen ratio, and surface roughness). The surface characteristics must be entered into the program using defined values or the AERMET seasonal tables, which will require the land use type (e.g., water or forest) and the surface moisture (e.g., average, wet, or dry).

Terrain

Much of Maricopa County can be characterized as having relatively flat terrain; however, there may be instances where sources have simple to complex terrain. Typically, MCAQD defines terrain as the following:

- Complex terrain (AERMOD): terrain above the height of the plume center line
- Complex terrain (AERSCREEN): terrain above the height of the stack top
- Flat terrain: terrain equal to the elevation of the stack base
- Intermediate terrain: terrain above the height of the stack top but below the height of the plume center line
- Simple terrain: terrain lower than the height of the stack top

Most sources will use flat terrain in their modeling analysis, but if complex terrain is more representative, the AERSCREEN user guide must be used for more information on inputs.
See: gaftp.epa.gov/Air/aqmg/SCRAM/models/screening/aerscreen/aerscreen_userguide.pdf

Receptors and Ambient Area Boundary

The ambient air boundary must be determined before an ambient air quality impact assessment can be completed. 40 CFR Part 50.1(e) defines ambient air as, "…that portion of the atmosphere, external to buildings, to which the general public has access."

The ambient air boundary may be a fence line or other physical barrier or a facility's process area boundary, which is defined as the process areas within the facility occupied by emission generating activities, the area in the immediate vicinity of those activities, and the area between adjacent activities.

Receptors must be adequately placed throughout a modeling domain to determine areas of maximum predicted concentrations. The minimum distance to ambient air must be set at the ambient air boundary and a maximum distance to probe must be set at 1000 meters.

Special Considerations

Multiple Stacks

The impacts from two or more point sources can be conservatively estimated by modeling each point source independently and then adding the maximum concentrations together, regardless of the associated downwind distances. This is a useful approach when individual impacts are small and compliance with regulatory standards can be easily demonstrated without using a refined model.

The emissions from multiple stacks, which are located within 100 meters of each other and which have volumetric flow rates that differ by no more than 20 percent, can also be merged using the following procedure (EPA, Screening Procedures for Estimating the Air Quality Impact of Stationary Sources-Revised, EPA-450/R-92-019):

Step One: Compute the parameter M for each stack to be merged where:

$$M = \frac{(h_s \times V \times T_s)}{Q}$$

Where: M = merged stack parameter
h_s = stack height above ground in meters
V = volumetric flow rate = $(\pi/4)\ ds^2\ vs$ in (m^3/s)
d_s = effective stack exit inside diameter in meters
v_s = stack gas exit velocity in m/s
T_s = stack gas exit temperature in degrees K
Q = air contaminant emission rate in g/s

Step Two: Determine which of the stacks has the lowest value of M. This is the representative stack.

Step Three: Sum the emissions rates (Q) for the stacks that are being merged. This summed emission rate, along with the stack parameters for the representative stack, must be used in modeling the merged stacks.

NO and NO_2 Conversion

Most emission calculation methodologies use NO_x emission factors, which include NO and NO_2. For the most conservative approach, NO must be assumed to be converted into NO_2 without any additional justification; however, given the stringency of the 1-hour NO_2 standard relative to the annual standard, using less conservative approaches to NO_x conversion than simply full conversion may be necessary. As a result, any of the following methods for NO conversion may be used:

- Option One: Assume all NO is converted to NO_2.
- Option Two: Use the ambient ratio method (ARM). Multiply Option 1 by 0.8 as a default ambient ratio for the 1-hour NO_2 standard without additional justification. The national default ratio of 0.75 recommended in 40 CFR Part 51, Appendix W for the annual standard may not be used without some justification of the appropriateness for that assumption.
- Option Three: Use the ozone limiting method (OLM) or the plume volume molar ratio method (PVMRM) for NO conversion. The key input variables for these model options are

in-stack NO_2/NO_x ratios and background ozone concentrations. The in-stack NO_2/NO_x ratio is simply how much of the total NO_x in the outlet stream is already converted to NO_2. The background ozone concentration is needed for both methods as it is used in the calculations to determine the remaining NO conversion to NO_2. The ozone concentration can be specified in parts per million (ppm), parts per billion (ppb), or micrograms per cubic meter ($\mu g/m^3$).

- In-stack NO_2/NO_x ratios:
    - The EPA established a general acceptance of 0.50 as a default in-stack ratio of NO_2/NO_x for input to the OLM and PVMRM model options within AERSCREEN. If proposing an in-stack NO_2/NO_x ratio other than the default, sufficient justification and documentation must be provided to support the source-specific data on the in-stack NO_2/NO_x ratio.
- Background ozone concentrations:
    - Ozone concentration should be entered as a single most conservative value of the representative background concentration of ozone. The highest hourly ozone concentration over the model period should be used. The default value of 40 ppb in AERSCREEN should not be used. The highest hourly ozone concentrations are available from the EPA AirData website at: epa.gov/airdata.

The methodology above was taken from the EPA memorandum issued on March 1, 2011 entitled, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard". This memorandum is meant to supplement the memorandum issued by the EPA on June 29, 2010 entitled, "Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard". The 2011 memorandum provides further clarification and guidance on the application of Appendix W guidance for the 1-hour NO_2 standard. The memorandum does not apply to the other averaging periods of NO_2, nor does it apply to other pollutants with a standard based on a multi-year average.

Modeling for 1-Hour and 24-Hour Standards

Some sources may have higher-than-normal emissions triggered by certain events. For example, high short-term emissions may result from startup/shutdown operations or bypasses of control equipment. For compliance demonstrations with the 1-hour NO_2 or SO_2 NAAQS, special consideration should be given to determine whether such emissions should be included in the modeling analysis or not. Because of the probabilistic nature of the two standards, EPA recommends that the most appropriate data to use for compliance demonstrations for the 1-hour NO_2 and SO_2 standards are those based on emissions scenarios that are continuous enough or frequent enough to contribute significantly to the annual distribution of maximum daily 1-hour concentrations. Therefore, MCAQD may allow an exemption from 1-hour NO_2 and SO_2 modeling if these events are infrequent enough so that the emissions caused by these events will not contribute significantly to the annual distribution of maximum daily 1-hour concentrations. As this exemption determination is on a case-by-case basis, MCAQD must be provided with detailed information about these events such as frequency and duration.

For compliance demonstrations with the 24-hour or annual NAAQS, the modeled emission rates must incorporate a suitable number of these high-emission periods combined with normal equipment operations. For example, power generation facilities are typically permitted for a certain number of

startup/shutdown events. Therefore, calculations for 24-hour average emissions or annual emissions for a power generation facility must consider the emissions from startup/shutdown events combined with emissions from steady-state operations. MCAQD must be provided with detailed information about which option is being used for NO conversion.

Some examples are provided below for clarity:

- Example 1: A source operating a non-emergency engine triggers the requirement to demonstrate compliance with the 1-hour and 1-year NO_2 NAAQS and the 24-hour PM_{10} NAAQS. The engine is permitted to operate 1,000 hours in any 12-month period. Assume the highest maximum hourly emission rate at any given engine load for both the 1-hour and 24-hour timeframes. Alternatively, accept an enforceable daily run time limit and assume potential 24-hour emissions at that reduced maximum daily limit. To demonstrate compliance with the 1-year NO_2 standard, assume the maximum emission rate at 1,000 hours of operation.
- Example 2: A power generation facility with a simple cycle unit must model the 24-hour PM_{10} NAAQS and the 1-hour SO_2 NAAQS. The simple cycle unit will have a certain number of start-up and shut-down events throughout the year. A typical start-up event is 20 minutes, and a typical shutdown event is 12 minutes. This results in a worst-case scenario for an hour: 28 minutes normal operation, 20 minutes start-up, and 12 minutes shutdown. Each of these operating scenarios has its own hourly emission rate, which must be multiplied by the total time in which their events occur in an hour.

  X (lbs/hr in normal operation) x 28/60
  Y (lbs/hr in start-up) x 20/60
  Z (lbs/hr in shutdown) x 12/60

  The sum of these parameters is the worst-case emissions profile for the 1-hour NAAQS comparison. For the 24-hour PM_{10} NAAQS, the number of events that are likely to occur over a 24-hour period must be considered and as many events in the 24-hour window that are likely and frequent enough to occur in order to accurately characterize impacts must also be considered.

Secondary Formation of $PM_{2.5}$

In addition to being emitted directly, $PM_{2.5}$ is created by secondary formation from precursor emissions such as SO_2 and NO_x due to chemical reactions that occur in the atmosphere gradually over time (hours or days depending on atmospheric conditions and other variables). The process for considering precursors for $PM_{2.5}$ in an ambient air quality impact assessment consists of the following four steps:

Step One:

- Determine the primary $PM_{2.5}$, NO_x, and SO_2 PTE from a new source or the primary $PM_{2.5}$, NO_x, and SO_2 PTE increase for a modified source.
  - If primary $PM_{2.5}$ is above 7.5 tpy and NO_x and SO_2 are both below 20 tpy, secondary formation of $PM_{2.5}$ does not need to be evaluated and no further action for this section is required.

- If primary $PM_{2.5}$ is above 7.5 tpy and NO_x and/or SO_2 emissions are above 20 tpy, proceed to Step 2.
- If primary $PM_{2.5}$ is below 7.5 tpy, modeling is not required.

Step Two:

- Calculate the "total equivalent primary $PM_{2.5}$" emissions with the following formula which uses the interpollutant offset ratios for SO_2 and NO_x as defined in EPA's NSR implementation rule for $PM_{2.5}$ (73 FR 28321, 2008). For the purposes of simplifying the quantitative assessment, offset ratios are used. Ideally, if site specific offset ratio data for NO_x or SO_2 are available, those data must be used.

$$Total\ Equivalent\ Primary\ PM_{2.5}\ [tpy] = Primary\ PM_{2.5}\ [tpy] + \frac{SO_2[tpy]}{40} + \frac{NO_x[tpy]}{100}$$

Where:
- Primary $PM_{2.5}$, SO_2 and NO_x are all determined from Step 1.
- For a new source: Calculate the total equivalent primary $PM_{2.5}$ based on the facility-wide PTEs for primary $PM_{2.5}$, SO_2, and NO_x.
- For modifications: Calculate the PTE increase in total equivalent primary $PM_{2.5}$ based on the PTE increases for primary $PM_{2.5}$, SO_2, and NO_x due to the proposed projects.

- Proceed to Step Three.

Step Three:

- The applicant shall model only the primary $PM_{2.5}$ emissions from the source to identify the highest $PM_{2.5}$ concentration outside of the process area boundary. This concentration is defined as the modeled primary $PM_{2.5}$ ($\mu g/m^3$).
- Proceed to Step Four.

Step Four:

- Using the following formula, the applicant shall estimate the total impacts from primary $PM_{2.5}$ and secondarily formed $PM_{2.5}$:

$$Total\ PM_{2.5}\ Concentration\left(\frac{\mu g}{m^3}\right) = Modeled\ Primary\ PM_{2.5}\ \left(\frac{\mu g}{m^3}\right) x\ \frac{Total\ Equivalent\ Primary\ PM_{2.5}\ [tpy]}{Primary\ PM_{2.5}\ [tpy]}$$

Where:
- Modeled primary $PM_{2.5}$ ($\mu g/m^3$) is determined from Step 3
- Total equivalent primary $PM_{2.5}$ is determined from Step 2
- Primary is determined from Step 1
- The result is the [Total $PM_{2.5}$ Concentration] that includes the contribution of secondary formation for $PM_{2.5}$. MCAQD may request additional qualitative and

quantitative assessments on a case-by-case basis beyond what is outlined in this section.

Background Concentrations

When performing modeling, representative background concentrations must be added to each pollutant source modeled. Background concentrations are intended to account for other pollution sources not explicitly included in the modeling, such as natural sources and other non-modeled or unidentified sources of air pollution. The combined background concentration values and modeled values are compared to the NAAQS, at the appropriate averaging times, to determine if the facility could interfere with attainment or maintenance of the NAAQS.

The background concentration values chosen for modeling should be representative of the area in the vicinity of the facility and are usually obtained from the ambient air monitoring network. In almost all cases, these data can be obtained from the air monitor closest to the facility, depending on the monitor's scale and purpose; however, on rare occasions a more distant air monitoring site might better represent the area surrounding the facility. An explanation of why the selected air monitor is the most representative of background concentrations surrounding the facility must be provided in the modeling protocol. The modeling protocol and the selection of the source of background data are subject to approval by MCAQD.

The background concentrations described in Table 4 and the most recent three years of ambient air monitoring data must be selected. Background concentrations should be representative of regional air quality in the vicinity of a facility. Additional guidance for determining refined estimates of background concentration values from local monitoring data can be found in 40 CFR Part 51, Appendix W, Section 8.2.

In and around Maricopa County, ambient air monitoring is conducted by the following agencies:

- MCAQD
- Arizona Department of Environmental Quality (ADEQ)
- Fort McDowell Yavapai Nation
- Gila River Indian Community
- Salt River Pima-Maricopa Indian Community

These agencies publicly report the data from the various air monitoring sites to the EPA. Values can be downloaded from the EPA's Air Quality System (AQS) database (www.epa.gov/aqs, account required) or the AirData website (www3.epa.gov/airdata).

After choosing the suitable air monitoring site, use Table 4 to find the appropriate background form for the applicable pollutant. Background forms are unique to each NAAQS pollutant and averaging time and usually mirror the NAAQS form.

An exception to this is the PM_{10} form; the PM_{10} 24-hour average NAAQS form is based on the number of days exceeding the 150 $\mu g/m^3$ standard, which cannot be more than once per year on average. Due to fugitive dust events resulting from atypical weather events, a PM_{10} background form that is based on the first- or second-highest 24-hour average would be unduly high and contrary to the EPA

modeling protocol, which allows for the consideration of uncharacteristic meteorological conditions. MCAQD also recognizes that it would be unlikely that two independent events, one source-driven and one background-driven, would occur simultaneously at the same location; therefore, the background form for PM_{10} is the 98^{th} percentile of annual daily values, averaged over a three-year period. This form makes allowances for atypical weather conditions that better represent characteristic background conditions.

A spreadsheet containing the actual values for annual background concentrations can be found on MCAQD's permitting webpage. These values are updated annually.

Concentrations flagged as exceptional events do not need to be considered in background concentrations; however, it is not acceptable to exclude high concentrations caused by non-exceptional events.

Table 4: Determination Of Background Concentrations				
Pollutant	**Averaging Time**	**NAAQS Level**	**Form**	**MCAQD Background Form**
CO	8 hours	9 ppm	Not to be exceeded more than once per year	Highest concentration during most recent 3 years
	1 hour	35 ppm		
NO_2	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years	98th percentile of the annual distribution of daily maximum 1-hour values averaged across the most recent three years
	1 year	53 ppb	Annual Mean	Highest annual concentration for most recent three years
O_3	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years	Not Applicable
$PM_{2.5}$	1 year	12.0 µg/m^3	Annual mean, averaged over 3 years	Average of the annual values over most recent three years [a]
	24 hours	35 µg/m^3	98th percentile, averaged over 3 years	Average of the 98th percentile 24-hour values over most recent three years
PM_{10}	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years	98th percentile of the annual distribution of daily maximum daily values averaged across the most recent three years
SO_2	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years	99th percentile of the annual distribution of daily maximum 1-hour values averaged across the most recent three years
Pb	Rolling 3-month average	0.15 µg/m^3	Not to be exceeded	Highest concentration during most recent three years

[a]See Appendix N to 40 CFR Part 50 – Interpretation of the National Ambient Air Quality Standards for $PM_{2.5}$

Refined Modeling

Refined modeling requires more detailed and precise input data and utilizes more complex models in order to provide better estimates of ground-level concentrations. Refined modeling is required if the screening analysis results indicate that the predicted concentrations from the evaluated sources could exceed the NAAQS. Refined modeling may also be necessary if it is determined that a screening analysis will not adequately address the modeling scenario.

AERMOD is the recommended refined model for most regulatory modeling applications per 40 CFR Part 51, Appendix W. It is the applicant's responsibility to perform refined modeling.

Refined Modeling Process Overview

Refined modeling must be conducted in accordance with the ADEQ Air Dispersion Modeling Guidelines for Arizona Air Quality Permits (with certain exceptions as described in Section 10(0).

Modeling Protocol

A written modeling protocol must be submitted prior to performing any refined modeling analysis, and written MCAQD approval must be obtained before proceeding with the refined modeling.

Modeling protocols allow MCAQD to review the methodologies that will be used in the modeling analysis and to comment on modeling techniques in advance of significant modeling resource expenditure. A modeling report that is submitted without a pre-approved modeling protocol will be treated and reviewed as a protocol. If the modeling report is found to be deficient, it will not be approved by MCAQD, creating additional delays and wasted efforts.

Modeling Protocol Checklist

As an aid in developing a modeling protocol, MCAQD has created a checklist of typical modeling protocol elements (see Appendix D). The checklist does not address all possible components of a modeling protocol. Case-by-case judgments should be used to decide if additional aspects of the analysis need to be included in the modeling protocol or if certain elements are not necessary in a given situation.

Modeling Report

Subsequent to modeling, a modeling report must be submitted to MCAQD. Modeling reports should include a discussion of each relevant modeling protocol element listed in the modeling protocol checklist described in the previous section of this handbook as well as graphic figures which appropriately indicate facility impacts and ambient air boundaries. The following electronic modeling files must be included in the modeling report and must be submitted to MCAQD: model input files, model output files, model plot files, building downwash files, and meteorological data files.

The results section of the modeling report must include the following information:

- Model input and output files, including the meteorological data, receptor height, and other supporting modeling files
- A listing of maximum impacts and associated receptor locations, meteorological data, and the modeling scenario for each applicable averaging time and pollutant
- A comparison with the applicable SILs or NAAQS for the source under review

Incorporated Documents

ADEQ Air Dispersion Modeling Guidelines for Arizona Air Quality Permits
azdeq.gov/environ/air/permits/download/modeling_guidance.pdf

Exceptions to ADEQ Guidance

- Section 3.8: Given the dis-similarity of the other site locations, MCAQD approves upper-air data from Tucson only.
- Section 3.10: Given the availability of background data in Maricopa County, the use of background data from other states is prohibited. Background concentrations must be established using the methodology found in Table 4.
- Section 7.1.4: Given the availability of background data in Maricopa County, the 1-hour NO_2 background concentration must be established using the methodology found in Table 4.
- Section 7.1.6: MCAQD will evaluate intermittent NO_2 sources on a case-by-case basis.
- Section 7.2.4: MCAQD will evaluate intermittent SO_2 sources on a case-by-case basis.

EPA Modeling Guidance Documents

- EPA Guideline on Air Quality Models (GAQM) as codified in 40 CFR 51, Appendix W
epa.gov/scram/clean-air-act-permit-modeling-guidance
- Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard (U.S. EPA, 2010)
epa.gov/sites/production/files/2020-10/documents/clarificationmemo_appendixw_hourly-no2-naaqs_final_06-28-2010.pdf
- Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard (U.S. EPA, 2011)
epa.gov/sites/production/files/2015-07/documents/appwno2_2.pdf
- Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard (U.S. EPA, 2010)
epa.gov/sites/production/files/2015-07/documents/appwso2.pdf
- Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS (U.S. EPA, 2010)
epa.gov/sites/production/files/2015-07/documents/pm25memo.pdf
- Guidance for $PM_{2.5}$ Permit Modeling (U.S. EPA, 2014)
epa.gov/sites/production/files/2020-09/documents/guidance_for_pm25_permit_modeling.pdf

- U.S. EPA Haul Road Workgroup Final Report

epa.gov/sites/production/files/2020-10/documents/haul_road_workgroup-final_report_package-20120302.pdf

- Meteorological Data: AERMET files for the Phoenix area may be downloaded at: epa.gov/ceam/meteorological-data-arizona

Reference Documents

For more in-depth information regarding modeling, see the following documents:

- Guideline on Air Quality Models (GAQM) as codified in 40 CFR 51, Appendix W (U.S. EPA, 2005)
- Draft New Source Review Workshop Manual (U.S. EPA, 1990)
- Screening Procedures for Estimating the Air Quality Impact of Stationary Sources (U.S. EPA, 1992a)
- Guidance and clarification memoranda issued by the EPA Office of Air Quality Planning and Standards (OAQPS)
- Memorandum: Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2, National Ambient Air Quality Standard (Air Quality Modeling Group, C439-0 I, March 2011)
- Memorandum: Haul Road Workgroup Final Report Submission to EPA-OAQPS (Haul Road Workgroup Final Report, December 2011)

SECTION 4: MALFUNCTION AND EMERGENCY

This section provides guidance for preparing, submitting, and receiving reports of malfunction or emergency that occur at stationary sources.

Maricopa County Air Pollution Control Regulations Rule 140 (Excess Emissions) establishes affirmative defenses and associated administrative requirements for emissions in excess of an applicable emission limit due to malfunction, due to malfunction during scheduled maintenance, or due to startup and shutdown.

Maricopa County Air Pollution Control Regulations Rule 130 (Emergency Provisions) establishes criteria and administrative requirements for emergencies.

Within 24 hours of the time when an owner or operator first learns of the occurrence of excess emissions, an owner or operator must notify MCAQD of any emissions in excess of the limits established by the Maricopa County Air Pollution Control Regulations or by the applicable permit. MCAQD can be notified by calling 602-506-6734 or emailing AQCompliance@maricopa.gov.

Within 72 hours of the notification by telephone or email, an owner or operator must submit to MCAQD an excess emissions report. The report must include all of the following:

- Whether there was a sudden, unavoidable breakdown of equipment. MCAQD will use the following factors to determine whether the malfunction was caused by a sudden unavoidable breakdown and whether it could have been foreseen and avoided:
    - The condition leading to the malfunction must have been unpredictable in its nature. In evaluating unpredictability, the malfunction cannot be attributable to the standard operational process or to the normal operation of the equipment. Under this analysis, conditions such as poor fuel quality, condensing plumes, wet plumes, start-ups and shutdowns, or any exceedances due to poor design will not, in and of themselves, qualify for relief under the malfunction provisions.
    - Unpredictable implies an uncontrollable element. Those occurrences that continue over an extended period will at some point in time cease to be unpredictable. While this point in time is not easily defined, generally malfunctions occurring for longer than a 24-hour period will not be considered malfunctions.
- Whether an activity or event could have been foreseen and avoided.
- Whether repairs were made as expeditiously as possible:
    - Malfunctions cannot be attributable to poor maintenance. While it can be argued that any malfunction is ultimately preventable through proper maintenance, MCAQD interprets these criteria to mean maintenance activities that can be reasonably and appropriately expected of the owner or operator.
    - MCAQD will resolve any differences in what "reasonable maintenance" means by consulting the equipment operation and maintenance manuals, which should be provided by the owner or operator. In addition, MCAQD will consult any specific maintenance plans on file for the source. An owner or operator with a history of repeated malfunctions at specific emission units may be required to file an amended maintenance plan with MCAQD.
    - When experiencing a malfunction, an owner or operator must make appropriate repairs to the facility in a timely manner to alleviate and eliminate the malfunction. The owner or operator must also take necessary action to prevent the malfunction from occurring in the future. If an owner or operator fails to satisfy these requirements, the owner or operator will not be eligible for the affirmative defense.
- Whether excess emissions were minimized:
    - An owner or operator experiencing a malfunction is required to take sufficient action to alleviate the situation (i.e., minimize emissions during the malfunction as much as reasonably possible, including shutting down the process or operation). The owner or operator must also take necessary action to prevent the malfunction from occurring in the future. If an owner or operator fails to satisfy these requirements, the owner or operator will not be eligible for the affirmative defense.
- Whether all reasonably possible steps were taken to minimize the impact of the excess emissions on NAAQS:
    - An owner or operator does not have to conduct modeling to show that a malfunction has or has not caused a violation of the NAAQS. However, if an exceedance of the NAAQS is attributable to the source during a malfunction, the owner or operator will not be eligible for the affirmative defense.
- Whether the emissions monitoring systems continuously operated:
    - During a malfunction, the owner or operator must continue to operate emissions monitoring systems. If it is not possible, the owner or operator must provide

MCAQD with information explaining why it was not possible to operate the emissions monitoring systems.

- Whether the owner's or operator's actions were documented:
  - The owner or operator must document the actions regarding repairs, emissions minimization, operation of emissions monitoring systems, and information regarding the cause of the malfunction.
- Whether the excess emissions are a recurring pattern:
  - MCAQD will evaluate the malfunction along with other malfunctions reported by the owner or operator. If malfunction reports show repeating patterns or patterns that continue to occur on a regular and frequent basis, the owner or operator will not be eligible for the affirmative defense.
- Whether the owner or operator used good practices for minimizing emissions:
  - Malfunction does not allow relief for excursions caused by improper or careless operation of the emission unit (e.g., operator error will not be accepted as a malfunction).
  - If the owner or operator could have prevented the malfunction by implementing some prior, logical action that should have been recognized by the operator of the source, the malfunction might be invalidated. MCAQD will make this determination based on the data that were available to the owner or operator at the time of the incident.
- Whether there were exceedances of the relevant NAAQS:
  - An owner or operator does not have to conduct modeling to show that a malfunction has or has not caused a violation of the NAAQS. However, if an exceedance of the NAAQS is attributable to the source during a malfunction, the owner or operator will not be eligible for the affirmative defense.

Malfunction

To be eligible for an affirmative defense, an owner or operator of a source must notify MCAQD by telephone and in writing. If the owner or operator does not follow the notification requirements for malfunctions, the owner or operator will not be eligible for the affirmative defense.

No later than noon of the next business day/working day after the malfunction, an owner or operator must complete both of the following:

- Leave a voice message regarding the malfunction with the Compliance Supervisor on-call at 602-506-6734 and the Permitting Engineer on-call at 602-618-9337.
- Send an email to AQCompliance@maricopa.gov and AQPermits@maricopa.gov regarding the malfunction.

MCAQD must receive the written notification within 30 days of the malfunction. The owner or operator may use MCAQD's Malfunction Notification Form (see Appendix B), or their own form, as long as all of the information on MCAQD's form is included.

- MCAQD's Malfunction Notification Form addresses reporting of both excess standards.

- MCAQD recognizes that exceedances of parametric surrogate standards do not always represent the presence of excess emissions and will account for such occurrences in its analysis.

The owner or operator must also include all of the following information in the written notification:

- An explanation of the malfunction
- The reason the malfunction is considered a malfunction (i.e., unpredicted, emergency, or no control over event)
- The action taken to prevent future similar malfunctions

After reviewing the written notification, MCAQD will make a preliminary decision as to whether the malfunction meets the criteria for an affirmative defense. In addition, when MCAQD conducts an inspection of the source, the root cause of the malfunction and corrective action taken will be discussed.

When the Malfunction Does Not Meet the Affirmative Defense Criteria

If the malfunction does not meet the criteria for an affirmative defense and either remains ongoing or appears to be a serious event, MCAQD will:

- If a source has a continuous emission monitoring system (CEMS) for the pollutant in question, MCAQD will not immediately respond, although action may be taken based upon the impact of the malfunction to the environment. Enforcement decisions and/or other actions will be addressed upon the owner or operator's submittal of an excess emissions report.
    - The source will not be allowed to continue operations unless shutting down the process would cause an even greater hazard or expose more individuals to harmful pollutants.
    - If necessary, the procedures in the Maricopa County Air Pollution Control Regulations Rule 140 (Excess Emissions) and Rule 600 (Emergency Episodes) governing air pollution emergencies endangering public health will be used to stop the source from operating.
- If a source is not equipped with a CEMS, MCAQD will determine if immediate inspection is necessary to document the malfunction.

There may be occasions when even though the malfunction does not meet the affirmative defense criteria, MCAQD will not respond immediately provided the owner or operator is taking steps to eliminate or alleviate the malfunction.

In the AQD Online Portal, MCAQD will designate the malfunction as "disapproved".

- MCAQD will send the owner or operator a written notice indicating that the malfunction does not meet the affirmative defense criteria.
- MCAQD may request that the owner or operator submit a malfunction plan listing additional maintenance procedures and/or preventive measures and steps to be taken to minimize emissions during malfunction conditions.
- MCAQD may initiate enforcement proceedings.

Emergency

An emergency constitutes an affirmative defense to an action brought for non-compliance with the technology-based emission limits, if the owner or operator demonstrates all of the following through properly signed, contemporaneous operating logs or other relevant evidence:

- An emergency occurred
- The cause(s)of the emergency
- The owner or operator was properly operating the source at the time of the emergency
- During the emergency, the owner or operator took all reasonable steps to minimize levels of emissions that exceeded the emissions standards or other requirements in the permit
- The owner or operator as soon as possible contacted MCAQD:
    - Giving notice of the emergency
    - Submitting notice of the emergency by email to aqpermits@maricopa.gov, certified mail, facsimile or hand delivery within two business days/working days of the time when emission limits were exceeded due to the emergency. This notice must contain a description of the emergency, any steps taken to mitigate emissions, and corrective action taken.

MACT Sources

Section 112 (c) of the CAA requires the EPA to:

- Publish a list of industry group categories (major source and area source) and subcategories that employ, manufacture, or emit HAPs
- Promulgate technology-based emission standards for HAPs, which are called maximum achievable control technology (MACT) standards

Maricopa County Air Pollution Control Regulations Rule 210 (Title V Permit Provisions) requires that a permit application to construct or reconstruct any major source of HAPs contain a determination that MACT for new sources under Section 112 of the CAA will be met. Where MACT has not been established in the CAA, such determination must be made on a case-by-case basis under 40 CFR 63.40 through 63.44.

All sources subject to MACT standards are subject to specific reporting and recordkeeping requirements. Several of these reporting and recordkeeping requirements address malfunctions and include specific malfunction reporting requirements.

An owner or operator must develop and implement a written startup, shutdown, and malfunction plan that describes, in detail, procedures for operating and maintaining the source during periods of startup, shutdown, and malfunction. The owner or operator must also develop a program of corrective action for malfunctioning process and air pollution control equipment used to comply with the relevant standard. The owner or operator must:

- Maintain the plan on-site and must make the plan available to MCAQD for review upon request

- Maintain a record of actions taken during startup, shutdown, and malfunction and must demonstrate that the plan was followed
- Indicate whether or not the plan was followed in the MACT periodic reports

If an owner or operator deviates from the startup, shutdown, and malfunction plan, the owner or operator must record what action was taken and must notify MCAQD within two business days/working days after taking action inconsistent with the plan. The initial notification may be by email or telephone and must be followed-up with a letter within seven business days/working days after the end of the event. The report should include the when, where, and what happened, any excess emissions, and when the repair was completed.

In addition, an owner or operator must file a startup, shutdown, and malfunction report if a startup, shutdown, or malfunction occurred during a required reporting period.

SECTION 5: MONITORING SYSTEMS

This section provides guidance regarding periodic monitoring, parametric monitoring, and continuous assurance monitoring.

Monitoring is a general term for on-going collection and use of measurement data or other information for assessing performance against a standard or status with respect to a specific requirement.

Stationary source emissions monitoring collects and uses measurement data (or other information) at individual stationary sources of emissions.

Stationary source emissions monitoring is required to demonstrate that a source is meeting the requirements in federal or state rules that are part of a SIP. Most monitoring that stationary sources must conduct is related to specific regulation resulting from the CAA.

The permit must include the appropriate requirements for the installation, use, and maintenance (in an approved Operation and Maintenance (O&M) plan) of the appropriate instrumentation necessary to monitor the key operating parameters. In addition, the permit must specify the following:

- Key operating parameter(s) to be used to monitor for compliance
- Acceptable operating range for each parameter
- Requirement that the control equipment operate within the specified range(s)
- Requirement that periodic records be kept of the operating values of the key operating parameter(s)

Periodic Monitoring

Maricopa County Air Pollution Control Regulations Rule 210 (Title V Permit Provisions) requires that the following be included in a Title V permit to satisfy periodic monitoring requirements:

- Requirements, including stipulated requirements, concerning the use, maintenance, and, where appropriate, installation of monitoring equipment or methods
- Where the applicable requirement does not require periodic testing or instrumental or non-instrumental monitoring (which may consist of recordkeeping designed to serve as monitoring), periodic monitoring sufficient to yield reliable data from the relevant time period that are representative of the source's compliance with the permit as reported under Rule 210. Such monitoring requirements shall ensure use of terms, test methods, units, averaging periods, and other statistical conventions consistent with the applicable requirement. Recordkeeping provisions may be sufficient to meet the requirements of Rule 210.
- Any emissions monitoring and analysis procedures or test methods required under the applicable requirements, including any procedures and methods promulgated under Sections 114(a)(3) or 504(b) of the Act

Parametric Monitoring

Parametric monitoring (or also called periodic monitoring) is a type of continuous monitoring system that measures a parameter (or multiple parameters), which is a key indicator of system performance.

The parameter is generally an operational parameter of the process or the air pollution control device that is known to affect the emissions levels from the process or the control efficiency of the air pollution control device. Examples of parametric monitoring include temperature, pressure, or flow rate. A periodic record must be kept of one or more of the parameters.

Parametric monitoring is conducted in lieu of performance testing.

The following is a list of types of parametric monitoring that is generally acceptable for monitoring the performance of control devices:

- Baghouse
    - Pressure drop
    - Approved leak detector
    - Visible emissions
    - Inlet temperature, if in a high temperature application
- Cyclone
    - Visible emissions
- Thermal oxidizer
    - Combustion zone temperature
- Catalytic oxidizer
    - Pre-catalyst temperature
    - Post-catalyst temperature
    - Pressure drop across the catalyst
- Carbon adsorption
    - Adsorption temperature
    - Desorption temperature
    - Effluent concentration

- Packed bed scrubber
    - Pressure drop across the bed
    - Water and/or liquid recirculation rate
    - pH, depending upon the application
    - Conductivity or other reagent concentration or characteristics, as specified for proper operation and scrubber efficiency

Continuous Assurance Monitoring (CAM)

Performance tests must be performed in accordance with Code of Federal Regulations (CFR), Title 40, Part 64 (Compliance Assurance Monitoring) and permit conditions regarding parametric monitoring must meet all of the requirements of 40 CFR Part 64.

Title V permits must include CAM provisions where CAM is required. In addition to periodic and sufficient monitoring, all Title V permits are required to evaluate the applicability of CAM and include a CAM plan as appropriate. CAM is typically applicable either at permit renewal, or for large pollutant emitting sources, upon the submission of a significant Title V permit revision. The CAM requirements may be in addition to any periodic or sufficiency monitoring, to assure compliance with applicable requirements.

Emission limits or standards proposed by the EPA's Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the CAA are assumed to contain adequate monitoring requirements. Those promulgated before this date may or may not have adequate monitoring. Likewise, Maricopa County Air Pollution Control Regulations and the rules in the SIP may or may not have adequate monitoring specified. For applicable requirements that are not assumed to have adequate monitoring, MCAQD must examine each specific situation and determine if the monitoring requirements in the applicable requirement are sufficient to assure compliance.

If an examination of the situation indicates that additional monitoring is needed to assure compliance, MCAQD must determine the type of monitoring that will be required in the permit; this could include parametric monitoring for a control device that is used to meet an emission limit or standard.

SECTION 6: GUIDELINES FOR THE SEMICONDUCTOR INDUSTRY

Semiconductor fabrication facilities commonly produce very dilute emission streams, which typically result from the high ventilation airflow used in a clean room environment. Because of the very dilute pollutant concentrations, an owner or operator often finds it difficult, sometimes even impractical, to demonstrate compliance by conducting a traditional performance test.

This section provides three alternative methods for the semiconductor industry to demonstrate compliance:

- Acid/Base Emissions and the Wet Scrubber Performance Test

- Procedures to Determine Requirement for Operation and Maintenance Plan Point of Use/ Exhaust conditioner (EC units)
- VOC Abatement Performance Test

The alternative methods described in this section are voluntary and apply to a source that meets all of the following criteria:

- Semiconductor industry
- Non-Title V permit-related operations
- Acid/base emissions
- Performance test in conformance with the EPA test methods (40 CFR 60, Appendix A)

For point of use (POU) control devices or EC units, the owner or operator must follow one of the procedures outlined below to make a determination whether the subject POU or EC is required to complete one of the following:

- Submit an O&M plan.
- Demonstrate adequate maintenance and calibration (AMC).
- Conduct an air dispersion modeling/risk assessment.

MCAQD will accept AMC for an owner or operator who maintains records that demonstrate that the process and/or abatement instrumentation (which includes at least the sensor devices that trigger the interlock shutdown system) have been properly maintained and calibrated per manufacturer's recommendations or at least once a year per a written maintenance and calibration program commonly adopted by the semiconductor industry, whichever is more stringent. The owner or operator must maintain such records along with the maintenance and calibration program on-site and must make such documents available upon request.

An owner or operator is not required to submit an O&M plan or an AMC for any POU control device or EC unit that controls non-regulated air pollutants.

In semiconductor manufacturing, a number of different process tools are used to perform the various operations needed to make the final product. Some of these tools contain devices inherent to the equipment, which treat or condition the exhaust gases as they leave the process chamber. There are a variety of such exhaust conditioners used, but the primary intents are the same in all cases:

- Remove solids from the exhaust stream, which prevents solids deposition later in the exhaust duct. Since downstream exhaust problems can actually impact the manufacturing process, these devices improve process quality and reliability.
- Improve equipment uptime. Without the exhaust conditioner, process exhaust pumps will eventually fail.
- Reduce the amount of system maintenance needed, which avoids safety hazards related to blocked exhaust ducts.

Acid/Base Emissions and the Wet Scrubber Performance Test

Standard Permit Conditions

In order to provide consistent emissions testing requirements for all applicable sources, MCAQD applies the following standard permit conditions in permits:

- The Permitee shall conduct a test for the constituent emissions within 60 days after the equipment has achieved the capacity to operate at its maximum production rate on a sustained basis. The tests shall demonstrate a minimum removal efficiency of 90 percent by weight of the appropriate constituent.
- The time frame may be extended by the Control Officer for good cause, but in no case shall the testing period extend for more than 180 days after the initial startup of the equipment. The testing shall be conducted in accordance with EPA approved test procedures.
    - Initial startup should be determined as the earliest occurrence of one of the following dates:
        - The date that maximum (or permitted) production capacity occurs; or
        - The date that a marketable product has been produced; or
        - The date that sustained product manufacturing occurs; or
        - The date that the production line(s) or production processes, exhausted to the air pollution abatement equipment that require the test, have been qualified to produce product that meets customer requirements.
- The Permittee shall submit a test protocol to MCAQD for review and approval at least 30 days prior to the emissions test. A fee for each stack to be tested, as required by Maricopa County Air Pollution Control Regulations Rule 280 (fees), shall be submitted with the test protocol.
- The Permittee shall notify MCAQD in writing at least two weeks in advance of the actual time and date of the emissions test so that MCAQD may have a representative attend. Please email AQPermits@maricopa.gov.
- The Permittee shall complete and submit a report to MCAQD within 30 days after completion of the emissions test. The report shall summarize the results of the testing in sufficient detail to allow a compliance determination to be made.

Optional Compliance Demonstrations

After the completion of the performance test, should the owner or operator find the required performance test inadequate to demonstrate compliance, the following optional compliance demonstrations can be made as an alternative to the standard permit conditions.

Before making an alternative compliance demonstration, the owner or operator must submit a request to MCAQD. If accepted, a permit revision must be made to incorporate the alternative compliance demonstration.

Option A: If new or like-kind abatement equipment is installed, perform one of the following three demonstrations:

- Vendor performance curve (VPC)

- Mass emissions
- Non-detect

Vendor Performance Curve (VPC)

- Conduct the performance test required by the standard permit condition.
- If necessary, compare results to the VPC. To be acceptable by MCAQD, the VPC shall at a minimum demonstrate a 90 percent removal based on an inlet concentration of 10 ppmv or more of HCl emission, for example.
- If the corresponding test result is on or above any part of the curve for a measured inlet concentration, then submit all supporting data and the latest, revised O&M plan to MCAQD.
- If necessary, submit a request to MCAQD to revise the standard permit conditions to reflect VPC as the alternative compliance demonstration.
- Revise the O&M plan parameters in two phases: initial (before the test) and sustaining (after the test).

Mass Emissions

- Conduct the performance test required by the standard permit condition.
- Calculate mass emissions using data (outlet concentration) from performance test required by the standard permit condition.
- Use this data to conduct a modeling/risk assessment study based on models negotiated with MCAQD.
    - As an interim measure, MCAQD will accept a modeling/risk assessment study based on the AERSCREEEN air dispersion model (latest version) or other case-by-case MCAQD-accepted air dispersion model. See Section 3 for more information.
    - Modeling must show no exceedance of any parameter (concentration) for any regulated air pollutant at the property line.
- If modeled concentrations are less than the Acute and Chronic Ambient Air Concentrations (ACAAC) at the property line, submit all supporting data.
- If necessary, submit a request to MCAQD to revise the standard permit conditions to reflect mass emissions as the alternative compliance demonstration.
- Revise the O&M plan parameters in two phases: initial (before the test) and sustaining (after the test).

Non-Detect

- Conduct the performance test required by the standard permit conditions.
- If the test results show that the constituent is not detected in the stack at the test method detection limit, submit all supporting data. As an interim measure, MCAQD will accept an outlet concentration of one part per million volume (ppmv) or less as "non-detect" for a single constituent from one stack. For multiple stacks, a "non-detect" may be determined as an averaged concentration for the same constituent from all stacks tested.
- If necessary, submit a request to MCAQD to revise the standard permit conditions to reflect non-detect as the alternative compliance demonstration.

- Revise the O&M plan parameters in two phases: initial (before the test) and sustaining (after the test).

Option B: If any one of the following criteria is met, the owner or operator is eligible to request an exemption from the performance test requirement:

- Like-kind abatement equipment
- Abatement equipment installed for:
    - Non-production emission sources
    - Emergency release system, as defined in the CAA Section 112(r)
    - Emission sources for which emission reductions are not claimed and which inlet concentration does not exceed 1 ppmv for a single constituent prior to abatement equipment. The owner or operator shall calculate emissions before control using MCAQD-approved emission estimation techniques (EETs).
- CEMS
- Unregulated air pollutants
- POU control device and/or EC unit

Like-Kind Abatement Equipment

- If installing like-kind abatement equipment, which includes installing an additional scrubber or a scrubber as a stand-by unit, and a performance test has been completed and accepted in accordance with Option A for the initial abatement equipment, calculate emissions using MCAQD-approved EETs and/or with material balance.
- Submit all supporting data and an O&M plan to MCAQD.
- If necessary, submit a request to MCAQD to revise the standard permit conditions to reflect like-kind abatement equipment as the alternative compliance demonstration.

Upon request, pollution abatement equipment that meets the following criteria usually will not be required to conduct performance testing for the purpose of demonstrating compliance with permit conditions.

- Installed to replace existing equipment
- Installed as a standby unit to make existing equipment redundant or to be used as additional equipment
- Installed to treat permitted emissions described in the original equipment's vendor performance curve or source test protocol
- Modified only by changing the packing as long as the packing meets the criteria of the VPC

Like-kind abatement equipment is:

- Abatement equipment that is "functionally similar" (i.e., packed column counter-current, packed column co-current, packed column counter-flow, or plate column scrubbers) unless changes in technology are preapproved by MCAQD
    - Functionally similar means that there is no increase in emissions that is more than 10 percent of the appropriate major source threshold, and there is no new regulated air

pollutant to be treated or controlled per each control device other than those previously permitted.
    - Like-kind abatement equipment already compliance tested on similar processes usually will not require compliance testing.
- Abatement equipment that is monitored by at least the same parameters as were approved for the original abatement equipment. Additional parameters may be required to "monitor" to support the key operational parameters.
- Abatement equipment that has the same or better water dispersion (e.g., more nozzles or more efficient packing material) or has equivalent or greater removal efficiency for a known approved constituent as demonstrated by the VPC or previous performance test
- Abatement equipment with airflow that is within 50 percent of the original ACFM and water flow that is within 10 percent of the manufacturer's recommended flow

For like-kind abatement equipment, an owner or operator must submit the following to MCAQD:

- Written notification of replacement or installation
- O&M plan
- VPC
- MCAQD-approved performance test data for equipment the like-kind abatement equipment is replacing or duplicating

Perform a pre-approved modeling/risk assessment study, if abatement equipment is installed for any of the following:

- Non-production emission sources
- Emergency release system, as defined in the CAA Section 112(r)
- Emission sources for which emission reductions are not claimed and whose inlet concentration does not exceed 1 ppmv for a single constituent prior to abatement equipment. The owner or operator shall calculate emissions before control using MCAQD-approved EETs and/or with material balance.

If modeled concentrations are less than the ACAAC or other MCAQD case-by-case acceptable health-based guidelines at the property line, submit all supporting data.

- As an interim measure, MCAQD will accept a modeling/risk assessment study based on the screen air dispersion model (latest version) or other case-by-case MCAQD-accepted air dispersion model (see Section 3).
- Modeling must show no exceedance of any parameter (concentration) for any regulated air pollutant at the property line.

CEMS

- If an owner or operator proposes to install and operate a CEMS on the exhaust of the scrubber to measure hydrochloric acid, hydrofluoric acid emissions, or other MCAQD-approved constituent, a requirement for a performance test could be exempted. However, the owner or operator must perform a pre-approved modeling/risk assessment study. If results conclude

that modeled emissions are less than the ACAAC or other MCAQD case-by-case acceptable health-based guidelines at the property line, submit all supporting data. Modeling must show no exceedance of any parameter (concentration) for any regulated air pollutant at the property line.

Unregulated Air Pollutants

- If the owner or operator installs abatement equipment for unregulated air pollutants (e.g., acetone), MCAQD will not require a performance test.

POU Control Device and/or EC Unit

- Normally a POU control device or an EC unit would not be required to conduct a performance test. This is due to the size and configuration of relatively small piping to the unit. EPA test methods are neither feasible nor applicable to these types of devices due to the piping size constraint. However, the owner or operator may submit manufacturer test data or other documents for MCAQD's review to support the claim of emission reduction.

Procedure to Determine Requirement for Operation and Maintenance Plan Point of Use/Exhaust Conditioner Units

Unregulated Air Pollutants

There will be no O&M plan or AMC requirements for any POU control device or EC unit that controls unregulated air pollutants (e.g., acetone).

POU Control Devices that are Interlocked (Shutdown) to the Appropriate Process Equipment or EC Unit

When an emission reduction is claimed, the POU control devices are interlocked (shutdown) to the appropriate process equipment or EC unit. An O&M plan is not required in this case; however, the demonstration of AMC on selected POU or EC units must be presented. This requirement may be addressed in the permit conditions. MCAQD will review the final selection of POU or EC units to determine permitting requirements. For example, MCAQD may require an AMC demonstration such as maintenance records (e.g., when a sensor is calibrated or changed) for an arsine hydride gas EC.

The grouping of POU or EC units is allowed for the purpose of streamlining the AMC demonstration. See the example in the Sample AMC for Exhaust Conditioners table.

Sample AMC for Exhaust Conditioners			
Exhaust Conditioner	**Interlock Triggering Parameter**	**Measuring Device[a]**	**PM/Calibration Frequency**
Wet scrubber	Water recirculation rate or make-up water rate	Flowmeter, rotometer	Monthly
Oxidizer	Oxidation chamber temperature	Thermocouple	Replaced every six months[b]
Cold bed (Adsorber/Chemisorber)	Breakthrough sensor	Electrochemical cell, colorimetric paper, FTIR cell, conductivity probe	Replaced every six months[b]
Hot chemical bed	Breakthrough sensor	Electrochemical cell, colorimetric paper, FTIR cell, conductivity probe	Replaced every six months[b]
Reactor systems	Power	Wattmeter, drantz meter	Varies[c]
Pariculate removal	Pressure drop	Magnehelic, photohelic	Varies[c]

[a] These only represent examples and other monitoring devices that could be used.
[b] Based on manufacturer's recommendations
[c] To be discussed during MCAQD/Permittee meeting

POU Control Device That is Without an Interlock (Shutdown) System

When an emission reduction is claimed, an O&M plan is required. Visit maricopa.gov/1818 for more information.

No Emission Reduction Claimed

When no emission reduction is claimed for a POU control device or for an EC unit, there will be no requirement for an O&M plan or AMC.

A modeling/risk assessment must be conducted at the point(s) of discharge to the atmosphere only. The modeling /risk assessment must demonstrate no exceedance of ACAAC thresholds. If the subject constituent is not listed in ACAAC, threshold values from other states or air quality districts will be accepted. Threshold values of VOC from an area with an equal or more stringent nonattainment classification are preferred.

Volatile Organic Compound (VOC) Abatement Performance Test

Standard Permit Conditions

In order to provide consistent emissions testing requirements for all applicable sources, MCAQD applies the following standard permit conditions in permits:

- The Permittee shall conduct a test for VOC emissions within 60 days after the issuance date of the permit or within 60 days after the new applicable equipment has achieved the capacity to operate at its maximum production rate on a sustained basis, whichever occurs last. The testing deadline may be extended by the Control Officer for good cause, but in no case shall the testing deadline be extended beyond 180 days after the applicable date.
- Per Maricopa County Air Pollution Control Regulations Rule 270 (Performance Tests), the testing shall be performed with the process equipment operating at the maximum sustained production rate or under such conditions as approved by the Control Officer, based on representative performance of the source or facility.
- The testing shall be conducted in accordance with EPA-approved test procedures. The test shall demonstrate a minimum removal efficiency of 90 percent by weight of the appropriate constituent.
- The Permittee shall submit a test protocol to MCAQD for review and approval at least 30 days prior to the emissions test through the AQD Online Portal. A fee for each stack to be tested, as required by Maricopa County Air Pollution Control Regulations Rule 280 (Fees), shall be submitted with the test protocol.
- The Permittee shall notify MCAQD in writing at least two weeks in advance of the actual time and date of the emissions test so that MCAQD may have a representative attend. Please email AQPermits@maricopa.gov.
- The Permittee shall complete and submit a report to MCAQD within 30 days after completion of the emissions test. The report shall summarize the results of the testing in sufficient detail to allow a compliance determination to be made.

Optional Compliance Demonstrations

An owner or operator of new or replacement VOC emissions abatement equipment must conduct a performance test on all such equipment in accordance with Maricopa County Air Pollution Control Regulations Rule 270 (Performance Tests).

After the completion of the initial start-up performance test, should the owner or operator find the required performance test inadequate to demonstrate compliance, the following optional compliance demonstrations can be made as an alternative to the standard permit conditions.

Before making an alternative compliance demonstration, the owner or operator must submit a request to MCAQD. If accepted, a permit revision will need to be made to incorporate the alternative compliance demonstration.

- Option A: If new, replacement, or substantially similar VOC abatement equipment is installed, perform a non-detect compliance demonstration.
    - Conduct the performance test required by the standard permit conditions.

    - If the test results show that the total VOC measured as propane are not detected in the stack at the test method detection limit, submit all supporting data. MCAQD will accept as non-detect an outlet concentration at 10 ppmv or less total VOCs measured as propane. Multiple stacks from the same abatement equipment may be proportionately averaged.
    - If necessary, submit a request to MCAQD to revise the standard permit conditions to reflect non-detect as the alternative compliance demonstration.
    - Revise the O&M plan parameters in two phases: initial (before the test) and sustaining (after the test).

- Option B: If any one of the following criteria is met, the owner or operator is eligible to request an exemption from the performance test requirement:
    - Substantially similar VOC abatement equipment
    - VOC abatement equipment installed for:
        - Non-production emission sources; or
        - Emission sources for which emission reductions are not claimed and which inlet concentration does not exceed 10 ppmv total VOCs measured as propane prior to abatement equipment. The owner or operator shall calculate emissions before control using MCAQD-approved EETs and/or with material balance.
    - CEMS
    - Unregulated air pollutants
    - POU control device

Substantially Similar VOC Abatement Equipment

After conducting an initial start-up performance test in accordance with Maricopa County Air Pollution Control Regulations Rule 270 (Performance Tests), subsequent performance tests may be exempted upon approval by MCAQD for substantially similar VOC abatement equipment. To receive such exemption, an owner or operator must submit all of the following:

- A request in writing to MCAQD
- The latest, revised O&M plan
- MCAQD-approved start-up performance test data for equipment that is being replaced or duplicated
- A statement certifying that the substantially similar VOC abatement is operating as designed with respect to VOC abatement and optimum burner efficiency (where applicable)

For pollution abatement equipment (previously source tested) that meets the following criteria, performance testing for the purpose of demonstrating compliance with permit conditions may not be required:

- Existing equipment that has had an official source test conducted and is substantially similar to replicate equipment
- Existing equipment that has been installed as a standby unit to make existing equipment redundant or to be used as additional equipment

Substantially similar VOC abatement equipment is equipment of the same make, design, capacity, and technology (e.g., thermal oxidation or carbon adsorption) and reduces VOC emissions as efficiently (or better) as the original abatement equipment being replaced or for which redundancy or additional capacity is being provided. The O&M plan requirements are the same for the substantially similar equipment as those approved by MCAQD for the original equipment. A revised O&M plan is required for the addition of substantially similar equipment.

VOC Abatement Equipment Installed for Non-Production Emission Sources

The owner or operator must calculate emissions before control using MCAQD-approved EETs and/or material balance.

VOC Abatement Equipment Installed for Emission Sources for Which Emission Reductions are Not Claimed

The owner or operator must calculate emissions before control using MCAQD-approved EETs and/or material balance.

CEMS

If an owner or operator proposes to install a CEMS on the exhaust of the VOC abatement equipment to measure total VOCs (measured as propane or methane), a performance test may be exempted.

Unregulated Air Pollutants

If the owner or operator proposes to install abatement equipment for unregulated air pollutants (e.g., acetone), MCAQD will not require a performance test.

POU Control Device

Upon approval by MCAQD, some VOC abatement units may not require a performance test. This could be due to the size and configuration of relatively small piping to the unit. In this case, EPA test methods are neither feasible nor applicable to these types of devices due to the piping size constraint. However, the source may submit manufacturer test data or other documents for MCAQD's review to support the claim of emission reduction.

SECTION 7: OFFSET REQUIREMENTS

This section provides guidance regarding offset requirements in Maricopa County Air Pollution Control Regulations Rule 240 (Federal Major New Source Review (NSR)).

The offset requirements apply to:

- Nonattainment pollutants for which a new souce is classified as major
- Nonattainment pollutants which cause the change at an existing major source to be classified as a major modification

Standard Permit Conditions

In order to provide consistent emissions testing requirements for all applicable sources, MCAQD applies the following standard permit conditions in permits:

- The Permitee shall conduct a test for the constituent emissions within 60 days after the equipment has achieved the capacity to operate at its maximum production rate on a sustained basis. The tests shall demonstrate a minimum removal efficiency of 90 percent by weight of the appropriate constituent.
- The time frame may be extended by the Control Officer for good cause, but in no case shall the testing period extend for more than 180 days after the initial startup of the equipment. The testing shall be conducted in accordance with EPA approved test procedures.
- Data certified by EPA may be accepted in lieu of testing (e.g., tier standards for internal combustion engines).

General Requirements

- Offsets must be obtained for the same pollutant; interpollutant trading is not allowed.
- Offsets are not required for temporary sources, which will not operate in the nonattainment area for less than one year and provided the temporary source is regulated by and in compliance with a valid air quality permit.
- To be acceptable, the offsets must meet all of the following requirements:
    - Offsets must be obtained in the allowable offset area.
    - Offsets must be surplus.
    - Offsets must be identified in the permit when it is issued and in place before startup.
    - Offsets must be enforceable by the EPA Administrator.
    - Offsets must be quantifiable.
    - The combination of the new facility and the offsets must result in reasonable further progress toward reaching attainment for that pollutant.
    - An emission reduction offset may only be used if it will last for the lifetime of the facility and is legally and federally enforceable. An initial showing that the reduction will last for at least 15 years will be acceptable as demonstrating the lifetime of the facility requirement, unless a shorter timeframe is appropriate. However, this does not mean that the Permittee does not have to replace the offsets after 15 years if the offsets should no longer be valid and the facility is still in operation. The emission reduction offset will be considered legally enforceable if the offsets meet the requirements in Rule 240 (Federal Major New Source Review (NSR)) and Rule 204 (Emission Reduction Credit Generation, Certification, and Use).
- Replacing a VOC with a VOC of lower atmospheric reactivity does not generate an offset.
- A tons per year credit cannot be used for offset calculations if that timeframe does not represent the overall effect that the offset or offset requirement will have in reaching attainment. Seasonal sources are an example that may be subject to this restriction.
- The baseline period for calculating emission reduction credits is two calendar years before the year in which the application for the source that will utilize the offsets was filed. The Control Officer may, at his discretion, accept a different two-year period if the Control Officer deems

that period to be more representative of normal operations. However, in no case shall the time period extend back beyond five years. The baseline emission rate shall be the actual emission rate from the facility providing the offsets during the baseline period. However, as a means of encouraging pollution prevention, if the offset generator had voluntarily reduced actual emissions from previous levels, the offset calculations may be made using the appropriate emission factors for the two-year period before the change took place, even if it is outside of the accepted baseline period. This would result in the use of an emission rate outside the baseline period to be used in combination with the capacity utilization and hours of operation from the most recent two years or other two-year period accepted by the Control Officer as the baseline period. This approach may only be used if the voluntary reductions still meet all of the requirements necessary to be deemed as surplus as well as meeting all other applicable requirements at the time they will be used as offsets.

Offset Requirements for Ozone Nonattainment Areas

- Offset requirements for ozone nonattainnet areas apply to VOCs and NO_x.
- There are no modeling requirements and no net air quality benefit analysis requirements.
- Offset ratios must meet the requirements in Rule 240 (Federal Major New Source Review (NSR)).
- The allowable offset area is anywhere in the designated ozone nonattainment area.

Offset Requirements for Other Nonattainment Areas

- Offset requirements for other nonattainment areas apply to CO, PM_{10}, and SO_x, if the area is nonattainment for that particular pollutant.

SECTION 8: OPERATION AND MAINTENANCE (O&M) PLANS

This section provides guidance in the preparation of operation and maintenance (O&M) plans required as part of an air quality permit and/or Maricopa County Air Pollution Control Regulations.

The purpose of an O&M plan is to document the procedures and methods that will demonstrate the control device or equipment is being operated and maintained within acceptable parameters and limits.

Since some industries (e.g., chromium electroplating, secondary aluminum processing or cotton gin industries) may have specific requirements imposed by federal regulations, County rules, or permit conditions, each unit that is unique in type, capacity, or use must be included in a separate O&M plan. Multiple units can be combined in a single O&M plan provided such units are substantially similar in type, capacity, and use.

Information That Must be Included in an O&M Plan

General Information

This information provides facility identification and a summary understanding of the facility and equipment that are the basis for the O&M plan.

Operation Plan

Key operating parameters are quantifiable parameters (pressure drops, temperatures, and flow rates) that, once properly defined, are considered indicators that the equipment is functioning as designed. Appropriate operating limits for these parameters are an essential element of the O&M plan. If changing the location of a measurement device would affect its reading (e.g., the location of a thermocouple in a thermal oxidizer), then the location of the device must be documented either in the text of the O&M plan or through a scaled drawing.

An operations log sheet should be completed for every day the process and/or control device is in operation. At a minimum, operations log sheets must contain the following information:

- Equipment identification
- Date and time of readings
- Identification of the individual recording the data
- Operating parameters to be monitored including units of measure
- Operating limits (upper and lower limits)
- Locations for recording measurements
- Measurement frequency
- Additional information (e.g., any corrective actions taken or general comments)

For facilities with multiple units, data must be recorded on a single log sheet. Each unit and the corresponding measurements must be clearly identified.

All measurements must be recorded including those outside the operating limits at the time readings are taken. A copy of the actual operations log sheet(s) to be used at the facility must be included in the O&M plan.

The minimum acceptable operating parameters for common control devices are as follows:

- Wet scrubber: Scrubber system pressure drop and water recirculation rate, possibly pH level and conductivity depending on application
- Thermal oxidizer: Combustion temperature
- Catalytic oxidizer: Pre-catalyst temperature, post-catalyst temperature, and catalyst pressure drop
- Carbon adsorption system: Adsorption temperature, desorption temperature, and effluent concentration
- Baghouse: Baghouse pressure drop, visible emissions, and possibly inlet temperature, depending on application

- Cyclone: visible emissions

Maintenance Plan

Maintenance procedures (i.e., inspections, cleanings, lubrications, adjustments, replacements, and instrumentation calibrations) must be performed on a routine basis to ensure the equipment remains in peak operating condition.

At a minimum, maintenance checklists must contain the following information:

- Equipment identification
- Date and time of activity
- Identification of the individual performing the maintenance check
- Procedures to be performed including frequency of occurrence
- Results of inspection (e.g., acceptable, nozzle plugged, or belt cracked)
- Corrective actions taken (e.g., none, cleaned nozzle, or replaced belt)
- Additional information (e.g., observations or general comments)

A copy of the actual maintenance checklist(s) to be used at the facility must be included in the O&M plan. Consult the equipment manufacturer for specific procedures and performance frequencies appropriate for the equipment.

Create separate forms for each maintenance period (i.e. weekly or quarterly) or record multiple sets of procedures on one maintenance checklist (i.e. one month's worth of weekly and monthly procedures on one form).

Additional Information

Permit conditions may contain additional O&M plan requirements, such as training provisions. Supplemental information, such as process diagrams or equipment schematics, may be included only if it would be helpful in understanding the O&M plan. Do not provide a copy of the O&M plan supplied by the equipment manufacturer.

Depending on the particular equipment and its application at the facility, some operating parameters and maintenance procedures may not be applicable or additional items may be necessary. Changes to an existing O&M plan should be made by submitting a complete, revised O&M plan with a cover letter identifying all changes and the reason for such changes. Since unique circumstances may exist, MCAQD reserves the right to request additional information to ensure compliance with air quality regulations.

SECTION 9: REMEDIATION OF CONTAMINATED SOIL

This section provides guidance when remediating contaminated soil.

General Requirements

Persons planning to remediate contaminated soil must comply with Maricopa County Air Pollution Control Regulations Rules 200, 220, 241, and 320, and any other applicable requirements.

For a remediation site, Maricopa County Air Pollution Control Regulations allow one of the following:

- Up to 0.5 ton PTE of VOCs per year to be emitted into the atmosphere from soil remediation projects if no air pollution controls are being utilized.
- VOC emissions into the atmosphere greater than 0.5 ton PTE of VOCs per year if an air pollution control device is used which has a control efficiency for VOCs of at least 90 percent by weight.
- Aeration of the soil (e.g., land farming) in cases where no more than 100 yd^3 of contaminated soil are being remediated. This is not to be used as a way to treat large sites in small portions to avoid permitting procedures.

Rule 241 (Minor New Source Review (NSR)) requires persons involved in contaminated soil remediation to install BACT for sites emitting 40 or more tons of VOCs per year or to install RACT for sites emitting less than 40 tons of VOCs per year.

Rule 320 (Odor and Gaseous Air Contaminants) requires that where means are available to effectively reduce the contribution to air pollution from material evaporation, leakage, or discharge, the installation and use of such control methods, devices, or equipment shall be mandatory.

Persons involved in soil remediation must ensure that:

- Appropriate permits from MCAQD, ADEQ, and other applicable agencies have been obtained
- No gasoline contaminated soil is transported to another site in Maricopa County by a contractor or operator unless that site is permitted by Maricopa County to receive gasoline contaminated soil
- A dust control permit is obtained if any dust-generating operations will disturb a total surface area of 0.10 acre (4,356 square feet) or more
- No untreated soil will be excavated or stockpiled if the total quantity exceeds 100 yd^3 and contains VOCs with a true vapor pressure greater that 1.5 psia unless either of the following occur:
    - A soil vapor suppressant is applied and maintained in an appropriate manner to control VOC emissions into the atmosphere and the untreated soil is remediated within 30 days of excavation.
    - Contaminated soil which has been excavated is covered with a layer of uncontaminated soil no less than one foot deep and the untreated soil is remediated within 30 days of excavation.

To determine the effectiveness of the procedures listed above, the treated or covered soil must register 50 ppmv or less of VOCs when measured up to three inches from the surface with an organic vapor analyzer (calibrated for hexane) or equivalent method approved by MCAQD.

Site testing is allowed for up to eight hours duration without a permit.

Air Quality Permit Requirements

Rules 200, 210, and 220 require that persons involved in soil remediation obtain an air quality permit prior to beginning remediation unless specifically exempted by regulation. The following soil remediation sources are considered deminimis and, therefore, are exempt from air quality permitting requirements:

- Diesel contaminated soil where no heat is applied
- Sites involving only organic liquids which have a true vapor pressure of 1.5 psia or less under any actual conditions which may exist during the project
- Sites that emit less than the permitting thresholds

The application for an air quality permit must include the following:

- A narrative of the scope-of-work, including the methodology used to assess the problem, the findings of the assessment, and a summary of the remedial action plan
- Process flow diagram
- Equipment
- Air emissions
- Controls
- Work practices to be used to reduce air pollution
- O&M plan for control devices, if any

Analysis of soil samples for total VOCs must be performed in accordance with applicable EPA test methods (e.g., modified Method 8015, modified Method 418.1, or Method 8020).

If the persons involved in soil remediation can demonstrate the uncontrolled VOC emissions are consistently below 0.5 ton PTE of VOCs per year, the control device may be bypassed. A follow-up test must be conducted once every 30 days to verify the VOC emissions rate is below 0.5 ton PTE of VOCs per year from the system as it is normally operated. Should the VOC emisisons exceed 0.5 PTE of VOCs per year from the system, a control device must be used as abatement to reduce the emissions by 90 percent.

When no further remediation is needed, MCAQD must be notified of the site closure.

SECTION 10: PORTABLE SOURCES

This section provides guidance regarding portable sources. MCAQD regulates portable sources under Maricopa County Air Pollution Control Regulations Rule 200 (Permit Requirements) and ADEQ regulates portable sources under Arizona Administrative Code (A.A.C.), Title 18 (Environmental Quality), Chapter 2 (Department of Environmental Quality-Air Pollution Control), Article 3 (Permits and Permit Revisions), Section R18-2-324 (Portable Sources).

Permits for Portable Sources

When Issuing a Permit For a Portable Source:

- Any permit for a portable source must contain conditions that will assure compliance with all applicable requirements at all authorized locations.
- Whenever the owner or operator of a portable source operates a portable source in Maricopa County, such owner or operator must comply with all Maricopa County Air Pollution Control Regulations.
- An owner or operator of a portable source which will operate for the duration of its permit solely in Maricopa County must obtain a permit from MCAQD.
- An owner or operator of a portable source which has an MCAQD permit but proposes to operate outside of Maricopa County must obtain a permit from ADEQ.
- A portable source that has a permit issued by MCAQD and obtains a permit from ADEQ must request that the permit issued by MCAQD be terminated or suspended.
- A portable source with a current ADEQ permit need not obtain an MCAQD permit but is subject to the portable sources requirements in Maricopa County Air Pollution Control Regulations Rule 200.
- A portable source that has a permit issued by ADEQ and obtains a permit from MCAQD must request that the permit issued by ADEQ be terminated or suspended. Upon issuance of the permit from MCAQD, the permit issued by ADEQ is no longer valid in Maricopa County.
- If the owner or operator relocates the portable source in Maricopa County, the owner or operator must notify MCAQD of the relocation of the portable source.

When Moving a Portable Source:

- A portable source may be transported from one location to another within or across Maricopa County boundaries provided the owner or operator of such portable source notifies ADEQ and any agency that has jurisdiction over the geographic area that includes the new location of the portable source before the portable source is transported to the new location. The notification must include:
    - A description of the portable source to be transported including the MCAQD permit number or facility ID or the ADEQ permit number for such portable source
    - A description of the present location
    - A description of the location to which the portable source is to be transported
    - The date on which the portable source is to be moved
    - The date on which operation of the portable source will begin at the new location
    - The duration of operation at the new location

- An owner or operator of a portable source with a current ADEQ permit that moves such portable source into Maricopa County must notify MCAQD that such portable source is being transported to a new location and must include in such notification a copy of the ADEQ permit and a copy of any conditions imposed by the ADEQ permit. The portable source is subject to all regulatory requirements of the Maricopa County Air Pollution Control Regulations.

MCAQD and ADEQ regulate sand and gravel, concrete, and asphalt operations in Maricopa County. These operations can be portable or permanent.

Some sand and gravel, concrete, or asphalt operations are permanent, are located in Maricopa County, and have an MCAQD air quality permit/stationary source permit – for the permanent operations. Such operations might also have portable sources that have an ADEQ permit.

If a portable source that has an ADEQ permit is operating independently on property isolated from other facilities, the location would not require a permit from MCAQD. A typical example is a parcel alongside new road construction where a portable source is positioned and operated for a limited period of time, then moved to another location where the operation continues but is more closely located to where the road construction has moved. The location is subject to the following:

- When the operation ceases and the equipment is removed, the property reverts to its former unpermitted status and, will be treated as a vacant lot.
- Any disturbed surfaces that have not been stabilized will be regulated under Maricopa County Air Pollution Control Regulations Rule 310.01 (Fugitive Dust From Non-Traditional Sources of Fugitive Dust).
- Should there be any ongoing operations (i.e. bulk material handling) a permit from MCAQD would be required.

General Permits for Portable Sources

If a sand and gravel, concrete, or asphalt operation is permanent, located in Maricopa County, has an MCAQD air quality permit/stationary source permit, and uses portable sources that have an ADEQ permit at the same location as the operations that have an MCAQD air quality permit/stationary source permit, the portable sources are covered under a general permit with an authorization to operate (ATO) issued by ADEQ or the agency which specifies the equipment that is covered by the permit.

Co-Location

Co-location is the circumstance where, if two operational facilities meet certain criteria then the facilities are considered to be operating as one. In such a case, the emissions from both operations must be accounted for to avoid permitting thresholds that would change the permitting status of the combined facilities.

The following is an example of co-location: A source that sells rock products operates under a Non-Title V permit issued by MCAQD; however, the operator does not normally perform crushing or mining operations on a day-to-day basis relying instead, on a portable crusher (with an ATO from

ADEQ) that arrives on the property for a defined period of time, processes rock, and then moves on to another location, leaving crushed rock for future sale.

An equipment owner who has been issued an ATO from ADEQ may operate their equipment at a stationary source that is covered by a permit issued by MCAQD. This source may have the same or similar equipment already on site or it may be a site where related activity takes place during most of the year and equipment is brought on site for a limited period of time to generate product which is on site thereafter.

Since the source on which the portable crusher operates is covered by a permit and it meets the criteria of co-location, the equipment is covered under the permit issued by MCAQD. In this instance, the permit issued by MCAQD will have primacy since the addition of equipment to the stationary source is regulated by MCAQD's permit. While the portable crusher is located on the property covered by a permit issued by MCAQD, the ADEQ permit is considered secondary. MCAQD will assume primary responsibility for enforcement of MCAQD permit conditions as it applies to the source.

Clustering

The following is an example of clustering: A source may be operating under a permit issued by MCAQD and on an adjacent or nearby parcel not covered by MCAQD's permitted equipment may be a portable source authorized by ADEQ.

APPENDIX A: AERSCREEN DATA INPUT FORM

MCAQD regulates all facilities and sources that release air pollutants into the ambient atmosphere. The primary purpose of the AESCREEN Data Input Form is to provide technical information for a new or modified source to MCAQD in order to conduct screening air dispersion modeling to evaluate ground-level concentrations of criteria air pollutants for comparison against the NAAQS. Complete the form by typing or printing legibly. Enter information in the fields, as applicable to the emission point type. Note that not all data pertains to all emission point types. Complete one form per emission point. For assistance completing this form, please call the Permitting Division at 602-618-9337.

Instructions for the AERSCREEN Input Form

These instructions are provided to assist owners and operators of affected facilities and sources located in Maricopa County to provide accurate information related to emissions and exhaust parameters to MCAQD.

Please provide data in specified units. If providing data in units other than specified, clearly indicate by underlining entry and noting alternate units. Unit abbreviations are noted below.

lb/hr	pounds per hour
tons/yr	tons per year
ft	feet
°F	Fahrenheit
fps	feet per second
ACFM	actual cubic feet per minute
Btu/hr	British thermal units per hour

Section One - Facility Information

- Business name: Enter the business name, as filed with the Arizona Corporation Commission.
- Facility/Registered Entity Name: Enter the Facility/Registered Entity Name, if different than Business name.
- Current Permit Number: If applicable, enter the current air permit number.
- Address of site: Enter the address of the site, including city, and zip code.
- Contact Person Details: Enter the name, title, email, and phone number for the contact person for the permit.

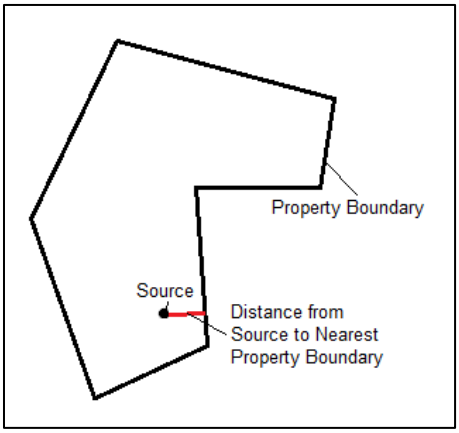
Section Two - Emission Point Characteristics

- Section 2a - Stack or Release Type:
    - Check the appropriate box for stack or release types. Select only one type per emission source. See the following table for source type descriptions.

Source Type	Source Options	Source Description	Examples
Point	Vertical Stack, Capped Stack, Horizontal Stack	An emission source where emissions are being released through a stack into the atmosphere. Point sources can have weather caps (select capped stack) and can discharge vertically (select vertical stack), horizontally (select horizontal stack), and downward (select capped stack).	Combustion exhaust from a heater, boiler, engine, or a thermal oxidizer, emissions from a baghouse, or dust collection system that is vented through a stack
	Flare	A flare is an elevated source that may be modeled using point source characterization or "flare" source characterization. Flare source characterization requires certain input parameters that are specific to the flare and may not be readily available. Section 2e should be completed if the design heat input rating for the flare is known.	Flare (industrial wastewater or landfill)
Fugitive	Volume	Fugitive emission sources that have an initial vertical dimension.	Open buildings, open storage tanks, building roof vents, multiple vents, conveyor belts, transfer points
	Area	A low-level or ground-level release with no plume rise. Area sources can be rectangular, circular, or polygonal in shape.	Storage piles, open pits, ponds

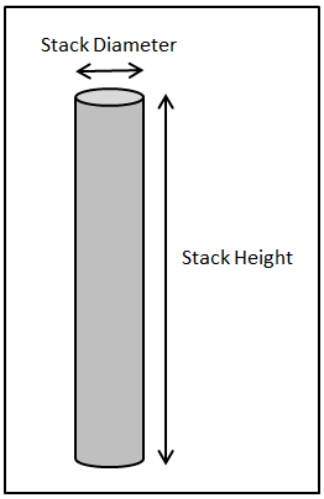
- Description of the Source: Enter a brief description of the source. Examples include: 20.0 MMBtu/hr natural gas-fired boiler, 600 hp diesel engine, emergency generator, stockpile, or process vent.
- Source ID: Enter the assigned Source ID from the air permit, or assign a source ID.
- Source Coordinates: Enter the source coordinates in latitude and longitude using decimal degrees, to the fourth decimal place (e.g., 33.2827 degrees). Coordinates can be obtained from GoogleMaps, GoogleEarth, the County Assessor's website (maps.mcassessor.maricopa.gov), or by using a cell phone compass application.
- Distance from Source to the Nearest Property Line: Enter the distance between the emission source and the nearest property boundary in feet. See Figure 2 for illustration.

Figure 2. Distance from Source to Nearest Property Boundary Illustration



- Section 2b – For Stacks/Point Sources Only (see Figure 3):
  - Stack Height (Above Ground): Enter the stack height, above ground-level in feet.
  - Stack Diameter: Enter the inside diameter of the exit point of the stack in feet.
  - Stack Exhaust Temperature: Enter the stack exhaust temperature at the exit of the stack in degrees F. If exhaust temperature is ambient, please indicate by writing "Ambient".
  - Stack Exit Flow Rate OR Exit Velocity: Enter the stack exit flow rate (in ACFM) OR exit velocity (in ft/s). You do not need to enter both.

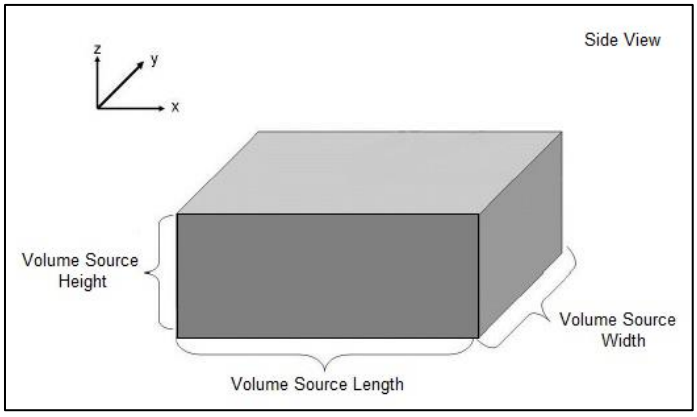
Figure 3. Stack height and stack diameter illustration.



- Section 2c - For Volume Sources Only (see Figure 4):
  - Initial Lateral Dimension of the Volume: Enter the width of the volume source divided by 4.3. For non-square sources, the width of the source should be reported as the minimum building length side.
  - Initial Vertical Dimension of the Volume: Enter the height of the volume source divided by 2.15.

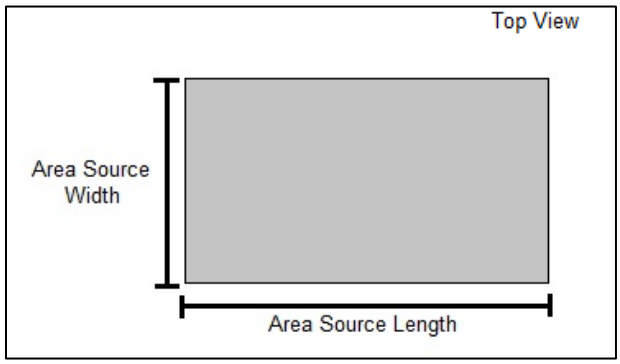
- Center Point of the Volume: Enter the center point height above ground of the volume source in feet.

Figure 4. Volume source parameter illustration.



- Section 2d - For Area Source Only (see Figure 5):
  - Release Height (Above Ground): Enter the release height, above ground-level in feet. Enter "0" for ground-based sources.
  - Area Source Length (if a Rectangular Source): Enter the Maximum Horizontal Dimension of the Source, or length of the longest side, in feet.
  - Area Source Width (if a Rectangular Source): Enter the Minimum Horizontal Dimension of the Source, or length of the shortest side, in feet.

Figure 5. Area source parameter illustration.



  - Radius of the Circle (if a Circular Source): Enter the radius of the circle of the source, in feet.
  - Optional:
    - Orientation Angle: Enter the orientation angle of the area source in degrees (0-360).
    - Initial Vertical Dimension of Plume: Enter the initial vertical dimension of the area source plume in feet.

- Section 2e - For Flares Only:
    - Heat Release Rate: Enter the maximum heat release rating of the flare in calories per second (cal/s).
    - Optional (if known):
        - Radiative Heat Loss Fraction: Enter the radiative heat loss fraction of the flare.

Section Three - Emission Rates

The emission rates reported should be appropriate for the pollutant averaging times as outlined below.

Pollutant	Averaging Time	Emisison Rate
CO	8 hours	lbs/8 hours
	1 hour	lbs/hour
NO_2	1 hour	lbs/hour
	1 year	tons/year
O_3	8 hours	lbs/8 hours
$PM_{2.5}$	1 year	tons/year
	24 hours	lbs/day
PM_{10}	24 hours	lbs/day
SO_2	1 hour	lbs/hour
Pb	Rolling 3-month average	lbs/3 months

Emission rates for lbs/hour, lbs/day or lbs/8 hours should represent the worst-case emission rate that could occur in any given time period. Emission scenarios that are continuous enough or frequent enough to contribute significantly to the maximum daily concentrations should be included. See the examples in the modeling guidance document Section 8.k. for assistance.

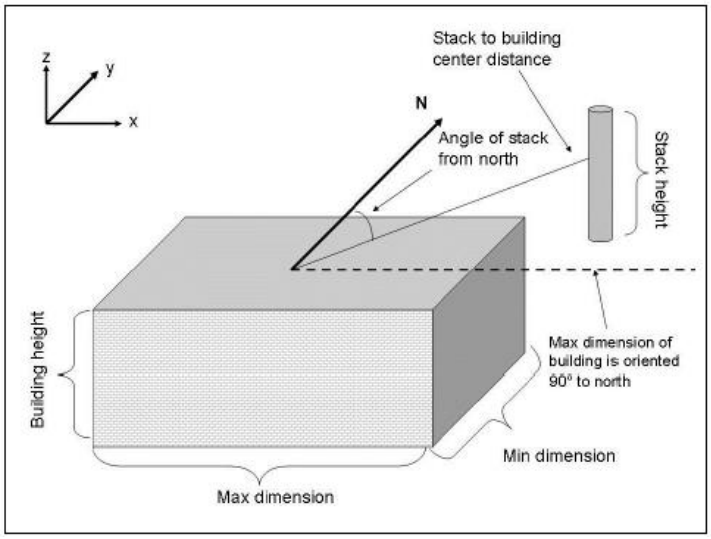
It is recommended the applicant consult MCAQD for any intermittent sources they are unsure of including.

Section Four – Building/Downwash Parameters (if applicable, only point sources)

- Provide information for the largest buildings in the region of influence of the stack. Provide building information only for point sources. An example for all building downwash parameters is provided in Figure 6. The region of influence is defined as a building that is within five times the lesser of its height or width from the stack.
- If the applicant has a BPIPPRM file, this should be provided to MCAQD instead of the parameters outlined below.
- Building Height: Enter the height of the dominant building, above ground-level in feet.
- Building Length: Enter the Maximum Horizontal Building Dimension or length of the longest side, in feet.
- Building Width: Enter the Minimum Horizontal Building Dimension or length of the shortest side, in feet.

- Distance between Stack and Center of the Building: Enter the distance between the stack and the center of the building in feet.
- Maximum Building Dimension Angle to North: Enter the angle (in degrees) from north of the longest side of the building. Angle range is 0 to 179 degrees. If unable to provide, ensure that site buildings are included on site plan required by the air permit application.
- Direction of Stack from Center of the Building: Enter the angle (in degrees) from north of the stack location relative to the center of the building. Angle range is 0 to 360 degrees. If unable to provide, ensure that site buildings are included on the site plan required by the air permit application.

Figure 6. Stack and building orientation for a building oriented 90 degrees to north and stack oriented 45 degrees to north. (From U.S. EPA's AERSCREEN User's Guide, EPA-454/B-15-005)



Section Five - Surface Characteristics

Provide information on the surface characteristics of the facility. The applicant may either use AERMET seasonable tables selecting Surface Profile Type and Climate Profile Type or user defined values for Surface Roughness, Bowen Ratio and Albedo.

- Surface Profile Type: Select the surface profile type that best fits.
  - Water, Coniferous Forest, Cultivated Land, Deciduous Forest, Grassland, Desert Shrubland, Swamp, or Urban
- Climate Profile: Dry should be used as the Climate Profile Type for Maricopa County; however, if Wet or Average are more representative, please provide an explanation for their use.

Or

- Surface Roughness: Provide the surface roughness for the facility area.
- Bowen Ratio: Provide the Bowen ratio for the facility area.
- Albedo: Provide albedo for the facility area.

MCAQD AERSCREEN Input Form

Maricopa County Air Quality Department
3800 North Central Ave, Suite 1400, Phoenix, AZ 85012
Phone: 602.506.6010 Fax: 602.372.0587
AQPermits@maricopa.gov

AERSCREEN Input Form

Complete one form for each source at the facility.

Section 1 - Facility Information

Business Name:
Facility/Registered Entity Name (if different):
Current Permit Number (if applicable):
Address of Site:
City: Zip Code:

Contact Person Details: Name: Title:
Email: Phone:

Section 2 - Emission Point Characteristics

Section 2a - Stack or Release Type

Vertical Stack:	☐	Complete Section 2b	Volume: ☐	Complete Section 2c
Capped Stack:	☐	Complete Section 2b	Area: ☐	Complete Section 2d
Horizontal Stack:	☐	Complete Section 2b		
Flare:	☐	Complete Sections 2b and 2e		

Description of the Source:

Source ID:

Source Coordinates (for all sources): Latitude Longitude

Distance From Source to the Nearest Property Line: (ft)

Section 2b - For Stacks/Point Sources Only: POINT

Stack Height (Above Ground):	(ft)	
Inside Stack Diameter:	(ft)	
Stack Exhaust Temperature:	(°F)	(indicate if ambient)
Stack Exit Flow Rate OR Velocity:		
Exit Velocity:	(fps)	
OR		
Flow Rate:	(ACFM)	

Section 2c - For Volume Sources Only: VOLUME

Initial Lateral Dimension of the Volume Source:	(ft)	
Initial Vertical Dimension of the Volume Source:	(ft)	
Centerpoint Height Above Ground:	(ft)	

Section 2d - For Area Sources Only: AREA

Release Height (Above Ground):	(ft)	
Area Source Length of Long Side (if Rectangular Area Source):	(ft)	
Area Source Length of Short Side (if Rectangular Area Source):	(ft)	
Radius of Circle (if Circular Area Source):	(ft)	
Orientation Angle (if applicable):	(Degrees)	
Initial Vertical Dimension of the Plume (if applicable):	(ft)	

Section 2e - For Flares Only: FLARE

Heat Release Rate:	cal/s	
Radiative Heat Loss Fraction (if known):		

Section 3 - Emission Rates:

		Carbon Monoxide (CO)	Nitrogen Oxides (NOx)	Particulate Matter ($PM_{2.5}$)	Particulate Matter (PM_{10})	Sulfur Dioxide (SO_2)	Lead (Pb)
Emission Rate - Maximum Hourly:	(lb/hr)						
Emission Rate - Maximum 8 Hour:	(lbs/8-hours)		—	—	—	—	—
Emission Rate - Maximum Daily:	(lbs/day)	—	—			—	—
Emission Rate - Annual:	(tons/yr)						
Emission Rate - Maximum 3 Month Average:	(lbs/3 months)	—	—	—	—	—	

Include an explanation as to how emissions were determined.

Section 4 - Building/Downwash Parameters (if applicable, only applies to point sources):

Building Height:	(ft)	
Building Length:	(ft)	
Building Width:	(ft)	
Distance Between Stack and Center of the Building:	(ft)	
Maximum Building Dimension Angle to True North:	degrees	
Direction of Stack From Center of the Building:	degrees	

If the applicant has a Building Profile Input Program for Plume Rise Model Enhancements (BPIPPRM), this should be provided to the Department instead of the parameters above

Section 5 - Surface Characteristics

If the applicant has an existing AERSURFACE output file for surface characterisitics, this should be provided to the Department instead of the parameters below.

If using the AERMET seasonable Tables:

Surface Profile Type:		(Select from the drop down list)
Climate Profile:	Dry	(If Wet or Average should be used, please explain)

If using user defined values:

Surface Roughness:	
Bowen Ratio:	
Albedo:	

MCAQD
Rev. 01/2016

APPENDIX B: MCAQD MALFUNCTION NOTIFICATION FORM

Date Reported Time Reported
Name of Person Filing Report
Phone Number
Company/Source Name
Plant Name Unit No.
Unit AIRS ID No.
Applicable Permit No.
Malfunction Started: Date Time
Malfunction Ended: Date Time
Total time of malfunction hours
Pollutants which exceeded emission standards:

POLLUTANT (SO_2, NO_x, PM_{10}, opacity)	**EMISSION RATE DURING MALFUNCTION (Lbs./hr, % Opacity, or quantity)**	**TOTAL EMISSIONS DURING MALFUNCTION (lbs or Tons)**

Detailed explanation of malfunction event, cause of the malfunction, and corrective actions taken to prevent a reoccurrence:

Please check all that apply:

- ☐ The excess emissions were caused by a sudden, unavoidable breakdown of equipment, or a sudden, unavoidable failure of a process to operate in the normal or usual manner, beyond the reasonable control of the owner or operator.
- ☐ The excess emissions did not stem from any activity or event that could have reasonably been foreseen and avoided, or planned for, and could not have been avoided by better operation and maintenance practices.
- ☐ Repairs were made as expeditiously as possible.
- ☐ The amount and duration of the excess emissions (including any bypass) were minimized to the maximum extent practicable.
- ☐ All reasonably possible steps were taken to minimize the impact of the excess emissions on ambient air quality.
- ☐ All emissions monitoring systems were kept in operation (if at all possible).
- ☐ The owner or operator's actions during the period of excess emissions were documented by properly signed, contemporaneous operating logs or other relevant evidence.

Signature: _____

Title:
Date:

APPENDIX C: COMMONLY USED TERMS AND MEANINGS

Commonly Used Terms and Meanings: For the purposes of this handbook, the following definitions apply. If the document referenced for these definitions is revised, the most recently revised document for these definitions applies. Please see the Acronyms section of the handbook for the full name of abbreviated terms.

Term	Meaning
AERSCREEN	A simple screening-level air quality model based on AERMOD used to provide a conservative estimate of pollution concentrations at specified ground-level locations (called receptors) surrounding a single emission source.
AERMET	A meteorological data preprocessor for AERMOD. AERMET processes commercially available or custom on-site meteorological data and creates two files: a surface data file and a profile data file. The AERSURFACE tool can be used to estimate the surface characteristics for input to AERMET.
AERMOD	A refined model used to produce more accurate concentration estimates that requires detailed and precise input data. A refined model is capable of estimating multiple emission sources and receptors.
Annualized Cost Method	A method for calculating the emission control cost-effectiveness for BACT. In the method, the annualized cost of a particular control technology or technique is divided by the annual emissions reduction achieved by using the particular control technology or technique relative to baseline emissions. The annualized cost includes the capital cost of the control technology or technique amortized over its expected lifetime, plus annual operating and maintenance costs.
AQD Online Portal	The external interface that authorized facility representatives can access to view and manage information related to their facilities that is stored in the IMPACT database. The AQD Online Portal is used to submit applications for Title V and Non-Title V permits and applications for an ATO under a General permit. It is also used for submission of emissions inventories, asbestos notifications, virtual inspections, contact changes, facility changes, performance test protocols, and compliance reports.
Business Day/Working Day	Any day during which MCAQD is open for business, which is typically Monday through Friday but not on Maricopa County-recognized holidays that fall on any of the days Monday through Friday.
CALPUFF	A refined model used mainly to assess distant impacts of emissions, particularly at national parks and wilderness areas.
CEMS	The total equipment required to sample and analyze emissions or process parameters, such as opacity, NO_x, oxygen, or carbon dioxide and to provide a permanent data record.
EC Unit	Units that are used for safety and/or industrial hygiene purposes and are always interlocked to the process equipment and/or feed materials.
EET	One of four general techniques used to estimate emissions for annual emission reports: (1) direct measurement, (2) emission factor, (3) mass balance, and (4) engineering calculation.

Emergency	Any situation arising from sudden and reasonably unforeseeable events beyond the control of the source, including acts of God, that require immediate corrective action to restore normal operation, and that cause the source to exceed a technology-based emission limit under the permit, due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to the extent caused by improperly designed equipment, lack of preventative maintenance, careless or improper operation, or operator error.
MACT	The EPA regulates the emission of HAPs by industrial sources through MACT standards. MACT standards use the HAP emissions of the best-performing (or maximum achievable) industry sources to set the "MACT floor", the new minimum standard that an industry must at least meet in order to comply.
Minor Source	A source that emits less than or has the PTE less than 100 tons per year of any regulated air pollutant or less than 70 tons per year of PM_{10}.
POU	A control device that is installed in close proximity to the process equipment and is installed for the purpose of abating regulated pollutants. Normally, a POU is not interlocked with the associated process equipment.
Refined Model	A model, such as AERMOD and CALPUFF, used to produce accurate concentration estimates, which requires detailed and precise input data. A refined model is capable of estimating multiple emission sources and receptors.
Screen Model	A model, such as AERSCREEN or SCREEN3, used to provide a conservative estimate of pollution concentrations at specified ground-level locations (called receptors) surrounding a single emission source; however, in some cases a screen model may be used for facilities with multiple emission points (See Special Considerations).

APPENDIX D: MODELING PROTOCOL CHECKLIST

As an aid in developing a modeling protocol, MCAQD has created a checklist of typical modeling protocol elements. The checklist does not address all possible components of a modeling protocol. Case-by-case judgments should be used to decide if additional aspects of the analysis need to be included in the modeling protocol or if certain elements are not necessary in a given situation.

GENERAL PROJECT INFORMATION						
Owner/Operator						
Facility Name						
Facility Address						
Contact Person Name, Title, Email, Phone Number						
Facility Classification	Title V ☐		Non-Title V ☐			
Application Type	New Source ☐		Modification ☐			
Current Permit Number (if applicable)						
Location (UTM or Latitude/Longitude Coordinates)						
Attainment/Maintenance Pollutants [1]	PM_{10} ☐	$PM_{2.5}$ ☐	NO_2 ☐	SO_2 ☐	CO ☐	Pb ☐
Non-Attainment Pollutants [1]	PM_{10} ☐	$PM_{2.5}$ ☐	NO_2 ☐	SO_2 ☐	CO ☐	Pb ☐
Pollutants Modeled	PM_{10} ☐	$PM_{2.5}$ ☐	NO_2 ☐	SO_2 ☐	CO ☐	Pb ☐
Dispersion Model						
Regulatory Default Options	Yes ☐		No ☐			
Dispersion Parameters	Rural ☐		Urban ☐			
General brief description of facility operations						
Overview of the project						
GENERAL REGIONAL CHARACTERISTICS						
Maps and description of local topography, land use of the area surrounding the facility. Also discuss if there are significant human or natural activities that would contribute to background levels. Map should show the source location with respect to the following:						
• Urban areas						
• Nonattainment areas						
• Topographic features (terrain, river valleys, lakes, etc.)						
• Ambient air quality monitoring station(s)						
• Meteorological observation locations						
Description of regional climatology and meteorology. Focus should be given to discussions of meteorological parameters that most significantly influence the modeling analysis, such as regional and terrain-induced wind patterns.						
DETAILED FACILITY LAYOUT						

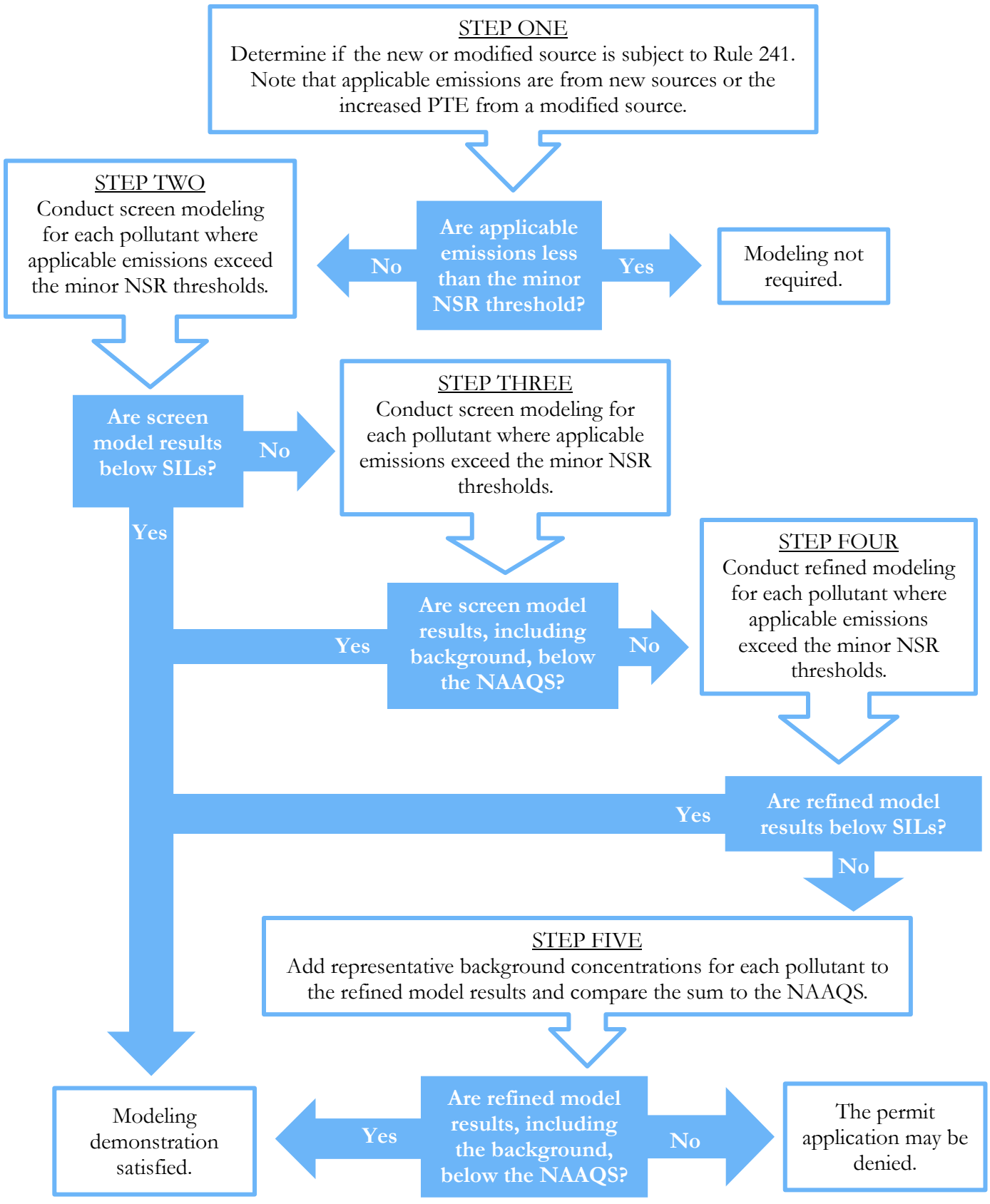
The applicant must provide a scaled site plan with a north arrow indicated that contains the following information:
• Locations of emission points (i.e. smokestacks, vents, etc.) at the facility. Clearly label all emission points that will be modeled. Emission point names should be traceable to a table that contains other required modeling information such as stack parameters and emission rates.
• Location of process equipment (i.e. storage tanks, silos, conveyors, etc.), lay down areas, parking lots, haul roads, maintenance roads, storage piles, etc.
• Location of all buildings at the facility. In addition, the applicant must indicate the height of each building (for single tiered buildings) and/or the height of each building tier (for multi-tiered buildings) on a site plan. If a site plan becomes too crowded, a table listing all this information can be provided instead, with the building ID traceable on the plot.
• Location of the facility's fence line and process area boundaries
• Location and name of any roads and/or properties adjacent to the facility (if applicable)
• Location of nearest residences, schools, and offsite workplaces
EMISSION PROFILES
Identify all emission units included in the modeling analysis and make them traceable to a facility site plan.
Provide brief but sufficient description of emission generation processes for each source (or source category).
If multiple emission scenarios are involved, evaluate each scenario and provide assumptions, conditions and methodologies for emission evaluation.
Identify maximum potential short-term emission rates for all modeled pollutants in lb/hr (or lb/day) and g/sec. The maximum short-term emission rate for each source should be used to demonstrate compliance with all short-term averaging standards and guidelines. It is important that the applicant provide emissions information for all averaging times to be considered in the modeling analysis. Potential short-term emission "spikes" from highly fluctuating short-term emissions sources (such as some types of kilns) also need to be characterized and considered in the modeling analysis.
Identify maximum potential long-term emission rates for all modeled pollutants in tons/yr and in g/sec.
Identify hr/day and hr/yr operational limits assumed for each source.
LOADS ANALYSIS
A loads analysis is required for equipment that may operate under a variety of conditions that could affect emission rates and dispersion characteristics. A loads analysis is a preliminary modeling exercise in which combinations of parameters (e.g., ambient temperature, source loads, relative humidity, etc.) are analyzed to determine which combination leads to the highest modeled impact. For example, turbines should be evaluated at varying loads and temperatures to determine the worst-case modeled impact.
STACK PARAMETERS
Describe how each modeled source is characterized (i.e., point source, area source, volume source, etc.).
For stacks, indicate if the stack is oriented vertically/horizontally and if a fixed rain cap is present.
List assumed stack parameters, including stack height, diameter, exhaust temperature, and exhaust flowrate, and make this information traceable to a facility site plan and emission inventory table.
MODELING APPROACH

Description of model selection
Description of model inputs/defaults and modeling methods proposed
Pollutants and sources considered
Methodology of determining source configuration. Include the following:
• Volume Source: Explain how the initial lateral and vertical dimension and release height were determined.
• Point Source: Explain how the stack exit velocity is derived. For a stack that multiple sources emit through, provide parameters used to derive the overall stack parameters, especially exit velocity and exit temperature.
• Line Source: Explain the source type and the configuration of the contributing individual sources.
• Other Type of Source: Provide a brief description of how the source configuration was determined.
Land use classification analysis
Description of the process area boundary
Proposed process area boundary and receptor grid configurations
Identification of the coordinate system and data used to plot the receptors
Discussion regarding the meteorological data proposed
Justification for the use of meteorological data if it is not based on the nearest meteorological monitoring station
Good engineering practice (GEP) stack height analysis
Justification of the background air quality monitoring data to be used
Include a description of terrain elevation data (types) used and how the elevation data were used to assign terrain elevation and hill height scales.
SPECIAL MODELING CONSIDERATIONS
Address any case-by-case modeling requirements raised by MCAQD (if applicable).
Discussion of any specific modeling considerations for the following:
• 1-hour NO_2 NAAQS
• 1-hour SO_2 NAAQS
• $PM_{2.5}$ NAAQS
• PM NAAQS
• Lead NAAQS
• Open burning/open detonation sources
• Buoyant line sources
COMPARISON WITH ACCEPTABLE AIR QUALITY LEVLES
In the final report, provide a comparison between modeled concentrations and the following as applicable:
• Significance levels
• NAAQS
REFERENCES
Provide reference to any documents or guidelines used to conduct the modeling, including:
• 40 CFR 51 Appendix W
• EPA Modeling Guidelines
• MCAQD Guidelines

A copy of the reference should be provided to MCAQD if requested.

[1]Current attainment status for each pollutant can be obtained from the following web site: www3.epa.gov/airquality/greenbook/ancl.html

APPENDIX E: PROCESS FOR CONDUCTING AN AIR QUALITY IMPACT ASSESSMENT FLOWCHART



APPENDIX F: ACUTE AND CHRONIC AMBIENT AIR CONCENTRATIONS (ACAAC)

Pollutant	Acute Ambient Air Concentrations (mg/m^3)	Chronic Ambient Air Concentrations (mg/m^3)
1,1,1-Trichloroethane (Methyl Chloroform)	2,075	2.30E+00
1,1,2,2-Tetrachloroethane	18	3.27E-05
1,3-Butadiene	7,514	6.32E-05
1,4-Dichlorobenzene	300	3.06E-04
2,2,4-Trimethylpentane	900	Not Applicable
2,4-Dinitrotoluene	5.0	2.13E-05
2-Chloroacetophenone	Not Applicable	3.13E-05
Acetaldehyde	306	8.62E-04
Acetophenone	25	3.65E-01
Acrolein	0.23	2.09E-05
Acrylonitrile	38	2.79E-05
Antimony Compounds (Selected Compound: Antimony)	13	1.46E-03
Arsenic Compounds (Selected Compound: Arsenic)	2.5	4.41E-07
Benzene	1,276	2.43E-04
Benzyl Chloride	26	3.96E-05
Beryllium Compounds (Selected Compound: Beryllium)	0.013	7.90E-07
Biphenyl	38	1.83E-01
bis (2-Ethylhexy) Phthalate	13	4.80E-04
Bromoform	7.5	1.72E-03
Cadmium Compounds (Selected Compound: Cadmium)	0.25	1.05E-06
Carbon Disulfide	311	7.30E-01
Carbon Tetrachloride	201	1.26E-04
Carbonyl Sulfide	30	Not Applicable
Chlorobenzene	1,000	1.04E+00
Chloroform	195	3.58E-04
Chromium Compounds (Selected Compound: Hexavalent Chromium)	0.10	1.58E-07
Cobalt Compounds (Selected Compound: Cobalt)	10	6.86E-07
Cumene	935	4.17E-01
Cyanide Compounds (Selected Compound: Hydrogen Cyanide)	3.9	3.13E-03
Dibenzofurans	25	7.30E-03
Dichloromethane (Methylene Chloride)	347	4.03E-03
Dimethyl Formamide	164	3.13E-02
Dimethyl Sulfate	0.31	Not Applicable
Ethyl Benzene	250	1.04E+00
Ethyl Chloride (Chloroethane)	1,250	1.04E+01

Etylene Dibromide (Dibromoethane)	100	3.16E-06
Ethylene Dichloride (1,2-Dichloroethane)	405	7.29E-05
Ethylene Glycol	50	4.17E-01
Ethylidene Dichloride (1,1-Dichloroethane)	6,250	5.21E-01
Formaldehyde	17	1.46E-04
Glycol Ethers (Selected Compound: Diethylene Glycol, Monoethyl Ether)	250	3.14E-03
Hexachlorobenzene	0.50	4.12E-06
Hexane	11,649	2.21E+00
Hydrochloric Acid	16	2.09E-02
Hydrofluoric Acid	9.8	1.46E-02
Isophorone	13	2.09E+00
Manganese Compounds (Selected Compound: Manganese)	2.5	5.21E-05
Mercury Compounds (Selected Compound: Elemental Mercury)	1.0	3.13E-04
Methanol	943	4.17E+00
Methyl Bromide	261	5.21E-03
Methyl Chloride	1,180	9.39E-02
Methyl Hydrazine	0.43	3.96E-07
Methyl Isobutyl Ketone (Hexone)	500	3.13E+00
Methyl Methacrylate	311	7.30E-01
Methyl Tert-Butyl Ether	1,444	7.40E-03
N, N-Dimethylaniline	25	7.30E-03
Naphthalene	75	5.58E-05
Nickel Compounds (Selected Compound: Nickel Refinery Dust)	5.0	7.90E-06
Phenol	58	2.09E-01
Polychlorinated Biphenyls (Selected Compound: Aroclor 1254)	2.5	1.90E-05
Polycyclic Organic Matter (Selected Compound: Benzo(a)pyrene)	5.0	2.02E-06
Propionaldehyde	403	8.62E-04
Propylene Dichloride	250	4.17E-03
Selenium Compounds (Selected Compound: Selenium)	0.50	1.83E-02
Styrene	554	1.04E+00
Tetrachloroethylene (Perchloroethylene)	814	3.20E-04
Toluene	1,923	5.21E+00
Trichlorethylene	1,450	1.68E-05
Vinyl Acetate	387	2.09E-01
Vinyl Chloride	2,099	2.15E-04
Vinylidene Chloride (1,2-Dichloroethylene)	38	2.09E-01
Xylene (Mixed Isomers)	1,736	1.04E-01